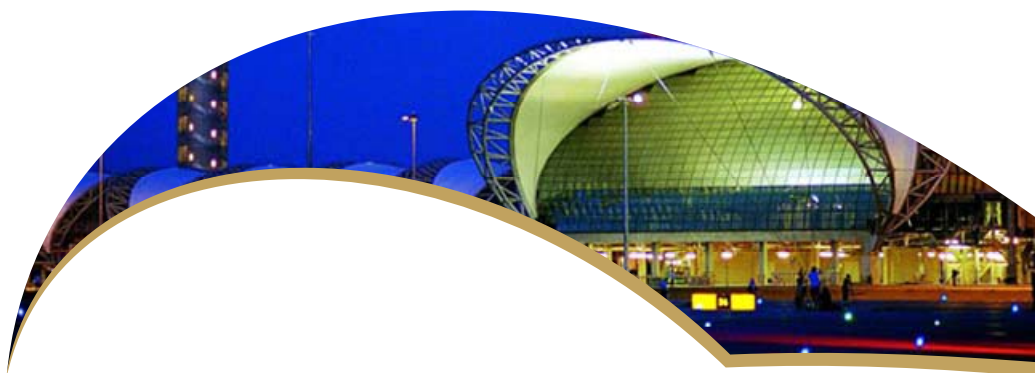




Office of Transport and Traffic Policy and Planning
Ministry of Transport

Transport Development Plan for Suvarnabhumi Aerotropolis

Executive Summary



AMP Consultants Ltd.

Chotichinda Mouchel Consultants Ltd.

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The Consultant

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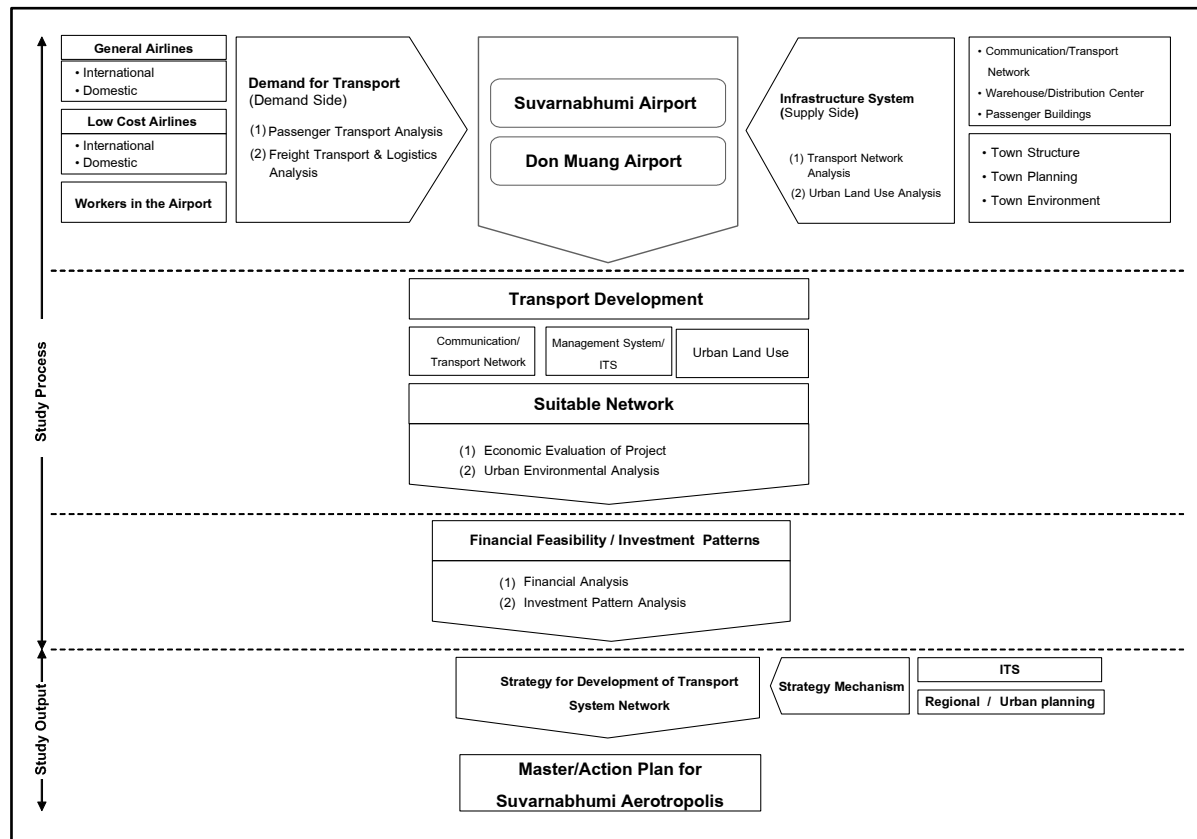
1. Background of the Project

Office of Transport and Traffic Policy and Planning, the main organization responsible for analyzing, recommending policy and plan, coordinating of transport and traffic programs and projects, including analyzing of projects and budgeting of Ministry of Transport along the National Economic and Social Development Plan and the Government policy, sees itself to be appropriate to organize the planning study for the development of the transport system to support Suvarnabhumi Aerotropolis to become the aviation hub of the Region. The planning should be integrated and coincided with the planning study carried out by Office of National Economic and Social Development Board aimed at strengthening the aviation hub of the Region, the IMAC study carried out by Office of Transport and Traffic Policy and Planning, and the city planning study in the surrounding area of Suvarnabhumi Airport carried out by Department of Public Works and Town and City Planning. The objectives of the study, therefore, are set as follows:

- (1) To study and analyze demand for passenger and freight transport within the area of Suvarnabhumi Aerotropolis, and the developments in the adjacent areas.
- (2) To study and analyze the existing transport and communication networks and the future plans linking Suvarnabhumi Airport to other facilities/physical infrastructure in the development of logistics systems such as industrial estate, collection and distribution centers of freight and passengers, so that the problems and obstacles are known.
- (3) To study and analyze the effects upon transport and traffic derived from the government policy to use Don Muang Airport in parallel with Suvarnabhumi Airport.
- (4) To recommend the appropriate network patterns and guidelines for the management of appropriate transport and traffic system required for long term demand for passenger and freight transport to support the logistics system and Suvarnabhumi Airport to be the aviation hub of the Region.
- (5) To study and analyze the financial and economic feasibilities, and the pre-feasibility of environmental effects of the recommended networks including the prioritization of such network development.
- (6) To set up Transport Development Master Plan (10 Years) for Suvarnabhumi Aerotropolis, and Transport Development Action Plan (5 years) for Suvarnabhumi Aerotropolis and the adjacent areas in consistency with the future city planning, developing of logistics system and other related activities.

1.1 Framework for Transport Development

Overall concept and steps of work of this study can be summarized as follows: (Figure 1.1-1)



Source: The Consultant

Figure 1.1-1 Overall Concept and Steps of work for the Study

The main factors in considering the conceptual framework and strategy for the transport development are:

- (1) Demand for passenger and freight transport including related logistics processes,
- (2) Infrastructure system and existing potentials,
- (3) Network planning from updated transport model including economic and environmental feasibility, subject to strategic mechanism such as management, application of Intelligent Transport Systems (ITS), regional and city planning, and
- (4) Financial analysis, appropriate patterns of investment for recommended network, and analyzing for priorities of such network development.

These factors will be synthesized in order to form the Transport Development Master Plan and Action Plan for Suvarnabhumi Aerotropolis.

The conceptual framework for the development of Suvarnabhumi Aerotropolis covers the government policy of Dual Airport, the transport network development especially on linking and supporting Suvarnabhumi Airport and Don Muang Airport, including the recommendation in terms of Single Airport Policy.

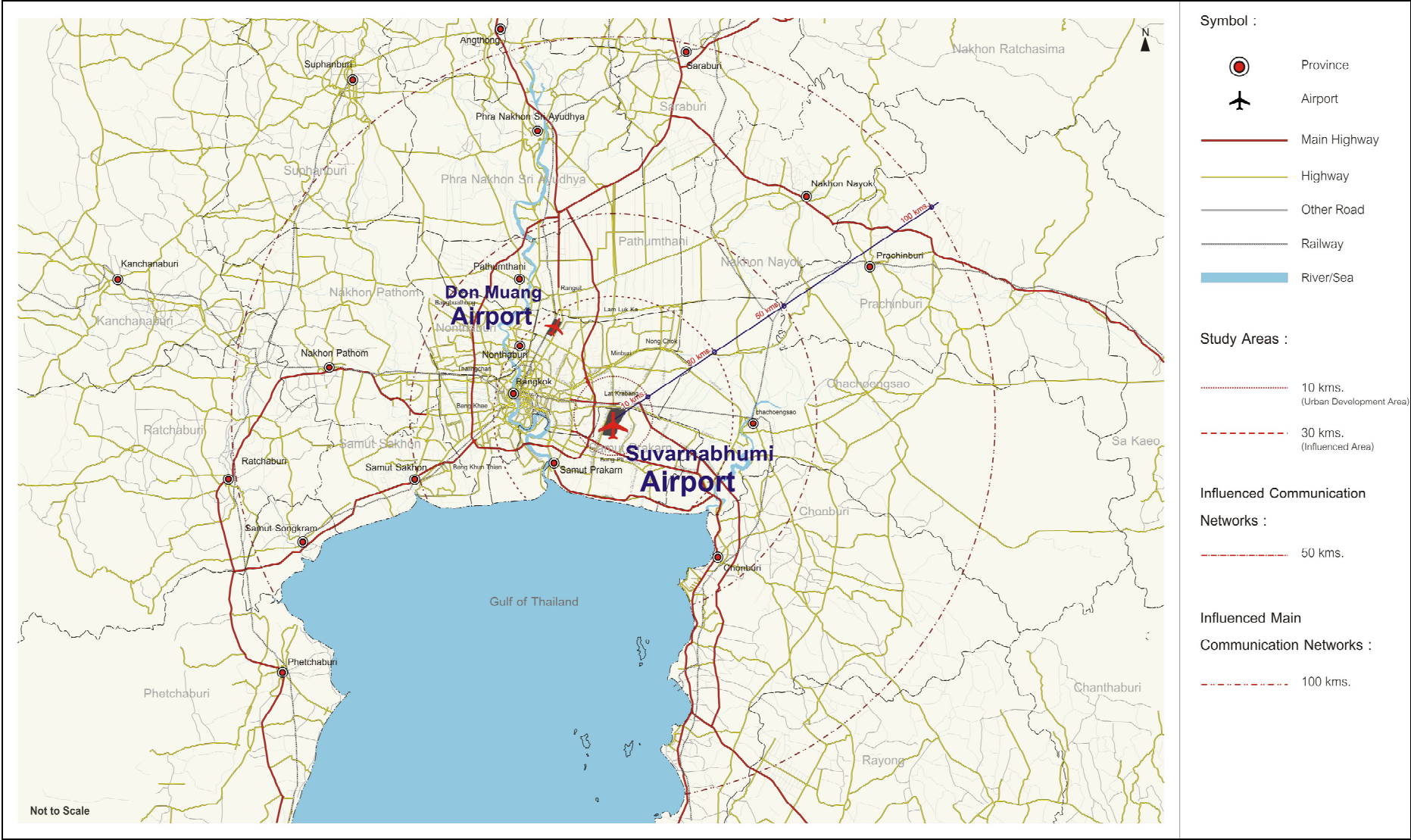
1.2 Study Areas

The study covers the areas around Suvarnabhumi Airport and Don Muang Airport within the radius of 10, 30, 50 and 100 kilometers respectively. The transport system in these areas will be developed with the objective to strengthen the capability of Suvarnabhumi Aerotropolis to become the aviation hub of the Region. Details of the areas are shown in Table 1.2-1 and Figure 1.2-1.

Table 1.2-1 Study Areas and Important Linkages

Study Areas	Radius	Linkages	Provinces
(1) Areas around Suvarnabhumi Airport.	10 kms.	Internal linkages	1. Bangkok 2. Samut Prakarn
(2) Influenced areas around Suvarnabhumi Airport.	10-30 kms.	Linking to Don Muang Airport	1. Bangkok 2. Samut Prakarn 3. Chachoengsao 4. Pathumthani 5. Nonthaburi
(3) Influencing communication networks around Suvarnabhumi Airport.	30-50 kms.	Linking with Bangkok and its vicinity areas including adjacent economic areas.	1. Chachoengsao 2. Pathumthani 3. Nonthaburi 4. Nakhon Pathom 5. Samut Sakhon 6. Nakhon Nayok 7. Prachinburi 8. Phra Nakhon Sri Ayudhya 9. Chonburi
(4) Influencing main communication networks useable for passenger and freight transport around Suvarnabhumi Airport.	50-100 kms.	Linking with other regions	1. Chachoengsao 2. Pathumthani 3. Nonthaburi 4. Nakhon Pathom 5. Samut Sakhon 6. Nakhon Nayok 7. Prachinburi 8. Phra Nakhon Sri Ayudhya 9. Chonburi 10. Saraburi 11. Suphanburi 12. Kanchanaburi 13. Ratchaburi 14. Samut Songkram 15. Rayong 16. Angthong

Source: The Consultant



Source: The Consultant

Figure 1.2-1 Study Areas and Important Linkages

2. Vision and Policy for the Use of Suvarnabhumi Airport

2.1 Vision

Ministry of Transport constructed Suvarnabhumi Airport in order to strengthen Thailand's position to become "the aviation transport Hub of the Southeast Asia Region". The construction of Suvarnabhumi Airport was carried out in accordance with the strategy to enhance the economic competitive ability and capability of the country under The National Economic and Social Development Plan, and the country's comparative geographic advantage.

2.2 Policy for the Use of Suvarnabhumi Airport

The Cabinet approved, on May 7, 1991, the construction of the Second Bangkok International Airport. Airport Authority of Thailand, at that time, was assigned to be responsible for the Project, scheduled to be opened within the year 2000. Due to delay in construction, the new airport was opened on September 28, 2006 with the name later given by the King as Suvarnabhumi Airport. At the start of servicing, the government policy was that of a Single Airport by which all the Scheduled flights were moved to Suvarnabhumi Airport.

Soon after the opening, the number of passengers using Suvarnabhumi Airport was almost at the airport capacity and the airport has started to become crowded. The government, led by General Surayuth, set up a policy to use Don Muang Airport as another international airport in parallel with Suvarnabhumi Airport. At the beginning, the domestic airlines with no flights connected with international flights can voluntarily use Don Muang Airport.

It can be seen, therefore, that a Dual airport policy, having two main airports, is important for the study on transport development plan for Suvarnabhumi Aerotropolis. Such important policy is key to the ground level network planning in supporting the role of Suvarnabhumi Airport.

Though the government has a strong intention in strengthening Suvarnabhumi Airport to be the Aviation Hub of the Region, it is not clear that the policy will be that of Single Airport or Dual Airport. The study on transport development plan for Suvarnabhumi Aerotropolis, therefore, must cover both policies of Single Airport and Dual Airport in order to provide appropriate service facilities for both airports leading to the analysis of transport development for Suvarnabhumi Aerotropolis.

3. Transport Development for Suvarnabhumi Aerotropolis

The Study on Transport Development Plan for Suvarnabhumi Aerotropolis coincided with, and was therefore integrated with, the Planning Study for the Aviation Hub carried out by Office of National Economic and Social Development Board (NESDB), the IMAC Study of Office of Transport and Traffic Policy and Planning, and the study for specific plan in the area around Suvarnabhumi Aerotropolis of Department of Public Works and Town and City Planning, with the main objectives as:

- To form the policy and appropriate development plan for the transport network.
- To specify the transport projects that should be implemented by the government in order to support the opening of Suvarnabhumi Airport, and the development of Suvarnabhumi Aerotropolis in the future.

The basic concept of this study is the balance of future demand for passenger and freight transport on the demand side and the infrastructure system to be constructed in accordance with the policy on the development of Suvarnabhumi Airport Hub on the supply side. Balancing of such demand and supply will lead to the recommended suitable transport system network. Financial analysis will be carried out on the system network before the investment pattern enabling actual operation can be considered. The process will lead to the formation of the Master Plan (2009-2019) and the Action Plan (2009-2013) of Transport Development for Suvarnabhumi Aerotropolis.

However, in order to gain the highest efficiency in the transport development, it is essential that the management on the potential capacity of Suvarnabhumi Airport, for flight landing and take-off must be implemented in order to set the policy for the future development of the Airport in parallel with the actual implementation.

3.1 Demand for Passenger and Freight Transport

Analyses of the demand for passenger and freight transport on the demand side have to be carried out for specifying the current and future demand for passenger and freight transport at Suvarnabhumi Airport, and between Suvarnabhumi Airport and Don Muang Airport. Such demand will lead to analysis for planning of appropriate transport system network. The analyses are as follows:

3.1.1 Passenger Demand Analysis

Passenger demand analysis was divided into traveling by international flights and traveling by domestic flights. In the study, total forecasted demand in 2021 will be 91.3 million persons of which 57.6 million persons are for international travel and 33.7 million persons are for domestic travel.

A comparison of the forecasted number of passengers and the capacity of Suvarnabhumi Airport showed that from the future development plan, carried out by Airports of Thailand Public Company Limited (AOT) the forecasted capacity of Suvarnabhumi Airport to serve the number of passenger will be 98.3 millions in 2021 while this study forecasted the number of passengers in the same year at 91.3 millions. However, it should be noted that the maximum capacity to support the passengers of Suvarnabhumi Airport is only 102 million persons and that would be reached in 2026.

3.1.2 Freight Transport Analysis

Major freight inflows-outflows at Suvarnabhumi Airport are:

- Industrial group of electronic parts, integrated circuits and electrical appliances, including machineries. Computer parts and accessories are the main products of this group.
- Industrial group of automobile parts and accessories.
- Agro-industrial group.
- Textile industrial and clothing group.

These freight groups have their origins mostly in Bangkok and its vicinity area (i.e. electronic products have the production bases in the north of Bangkok; textile groups locate in the area of Phetkasem road). The freight is transported to Suvarnabhumi Airport through the shortest routes, while avoiding existing traffic restrained measures, such as truck-banned areas during rush hour etc. It is forecasted that demand for air freight transport has a high rate of growth at 6.6 percent per annum. In 2007, the volume of incoming freight was 0.465 million tons and the volume of outgoing freight was 0.713 million tons. The forecasted volume in 2028 will be at 4.6 million tons of which 2.191 million tons are incoming and 2.384 million tons are outgoing freight. The plan has been considered on the accommodation of 6.4 million tons per year of total freight.

3.2 Infrastructure System

Analysis of the infrastructure on the supply side was carried out by reviewing studies on development planning of the transport system network relating to the development area of Suvarnabhumi Airport covering the period of 30 years from 2009-2039. Such studies had been done, for example, by Office of National Economic and Social Development Board, Department of Public Works and Town and City Planning, and Office of Transport and Traffic Policy and Planning. The studies included construction plans of the relevant operational organizations such as Bangkok Metropolitan Administration, Department of Highways, Department of Rural Roads, Expressway Authority of Thailand, and State Railway of Thailand. The analysis of networks in the area of development of Suvarnabhumi Airport brought about the appropriate network for transport development for Suvarnabhumi Aerotropolis during 2009-2019 and is summarized into 45 projects as detailed in Table 3.2-1.

Table 3.2-1 Appropriate Network for Transport Development for Suvarnabhumi Aerotropolis During the Period of 2009-2019

No.	Project	Type of Network				Responsible Organization
		Main/Expressway (Motorway)	Collector/Feeder Road	Truck Route	Rail System	
1	Sri Nakharintra - Bang Na - Samut Prakarn Expressway	✓				Expressway Authority of Thailand
2	Highway linking Don Muang - Minburi	✓				Department of Highways
3	Highway linking Ratchadabhisek - Kaset Navamintra	✓				Department of Highways
4	Main Road linking to Kingkaew Road	✓				Department of Rural Roads
5	Road linking to Highway No.34	✓				Department of Rural Roads
6	Road linking Ram Kham Haeng Road	✓				Bangkok Metropolitan Administration
7	Road (Highway No.7 - Highway No.34)	✓				Department of Rural Roads
8	Main Road parallel to Wat Kingkaew Road	✓				Department of Rural Roads
9	Extension of Suvarnabhumi Motorway Section 1 (M1-1)	✓				Expressway Authority of Thailand
10	Northern Section of the Third Stage Expressway (Khae Rai - Kaset Navamintra - Motorway)	✓				Expressway Authority of Thailand
11	Elevated Highway linking Don Muang - Suvarnabhumi Airport (Ram Intra Road - Outer Ring Road)	✓				Department of Highways
12	Elevated Highway linking Don Muang - Suvarnabhumi Airport (Navamintra Road - Outer Ring Road)	✓				Department of Highways
13	Road linking Udomsuk - Eastern Outer Ring Road		✓			Bangkok Metropolitan Administration
14	Highway linking Industrial Ring Road and Kanchanabhisek Ring Road South		✓			Department of Highways
15	Collector/Feeder Road (Outer Ring Road - Rom Klao Section 1, North Side)		✓			Bangkok Metropolitan Administration
16	Collector/Feeder Road (Kheha Rom Klao - Rom Klao Section 2, North Side)		✓			Bangkok Metropolitan Administration
17	Expansion of Praeksa Road		✓			Department of Highways
(18)	Improvement of Collector/Feeder Road linking Don Muang - Sai Mai - Hathairath - Rom Klao		✓			Department of Highways
(19)	Improvement of Collector/Feeder Road linking Don Muang - Sai Mai - Sukhabhival 5 - Ram Intra - Rom Klao		✓			Department of Highways
20	Expansion of Sukhumvit Road (Bang Pli - Khlong Daan)		✓			Department of Highways
21	MRT Red Line (Rangsit - Hua Lamphong)				✓	State Railway of Thailand
22	Extension of the Express MRT linking Suvarnabhumi and Don Muang Airports (Phayathai - Bang Sue - Don Muang Airport)				✓	State Railway of Thailand
23	MRT Green Line Section 1 (R3/1) and Section 2 (R3/2)				✓	Bangkok Metropolitan Administration / BTS

Table 3.2-1 Appropriate Network for Transport Development for Suvarnabhumi Aerotropolis During the Period of 2009-2019 (Cont'd)

No.	Project	Type of Network				Responsible Organization
		Main/Expressway (Motorway)	Collector/Feeder Road	Truck Route	Rail System	
24	Road linking Navamintra Road - Highway No.34	✓				Bangkok Metropolitan Administration
25	Road linking Ramkhamhaeng - Sukhumvit 77	✓				Bangkok Metropolitan Administration
26	Road linking Sri Nakharintra Road	✓				Bangkok Metropolitan Administration
27	Extension of Suvarnabhumi Motorway Section 2 (M1-2)	✓				Expressway Authority of Thailand
28	Expansion of Sukhumvit Road (Bang Pli - Khlong Daan)	✓				Department of Highways
29	Collector/Feeder Road (Outer Ring Road - Rom Klao Section 1, South Side)		✓			Bangkok Metropolitan Administration
30	Collector/Feeder Road (Kheha Rom Klao - Rom Klao Section 2, South Side)		✓			Bangkok Metropolitan Administration
31	New Main Road (Rom Klao - Eastern Ring Road Section 1, North Side)		✓			Bangkok Metropolitan Administration
32	New Main Road (Bang Pli - Suvarnabhumi Section 2, North Side)		✓			Department of Rural Roads
33	New Main Road (Rom Klao - Eastern Ring Road Section 1, South Side)		✓			Bangkok Metropolitan Administration
34	New Main Road (Bang Pli - Suvarnabhumi Section 2, South Side)		✓			Department of Rural Roads
35	Road along Highway No.7		✓			Department of Rural Roads
36	Collector/Feeder Road (Sukhumvit - Theparak)		✓			Department of Rural Roads
37	Road linking Highway No.3 - Theparaj Road		✓			Department of Rural Roads
38	Truck route (Aerolane) into the Airport (South Side)			✓		Department of Rural Roads
(39)	Road linking Highway No.7 - Highway No.34	✓				Department of Rural Roads
(40)	Road linking Highway No.3 - Theparaj Road	✓				Department of Rural Roads
(41)	The 3 rd Outer Ring Road	✓				Department of Highways
(42)	New Road (Highway No.34 - Theparak Road)		✓			Department of Rural Roads
(43)	Road along Eastern Ring Road Left Side (Sukhabhibal - Highway No.7)		✓			Department of Rural Roads
(44)	Road along Eastern Ring Road Right Side (Highway No.7 - Theparak)		✓			Department of Rural Roads
(45)	Truck route (Aerolane) into the Airport (North Side)			✓		Department of Rural Roads

Source: The Consultant

Note: () Project suggested by the Consultant

3.3 Planning for Transport Network and Intelligent Transport System

Infrastructure system, in this case, refers to transport network and related facilities, warehouse, distribution center, passenger terminal, as well as related systems. The existing system has been assessed of its capacity to accommodate future growth, as well as land use pattern and environmental concerns. This is to enable efficient plan for the transport network, and its related infrastructure and ITS system.

3.3.1 Transport Network Planning

According to the policy on the use of main national airports, the detailed analysis of the transport network for Suvarnabhumi Aerotropolis during the period 2009-2019 can be summarized into a network of 30 projects and 45 projects for Single Airport Policy and Dual Airport Policy respectively. These projects include rail, elevated/expressway (motorway) and at grade highway as shown in Table 3.3-1, Table 3.3-2 and Figures 3.3-1 and 3.3-2.

**Table 3.3-1 Summary of Transport Development Projects for Suvarnabhumi Aerotropolis
During the Period of 2009-2019**

Unit: Project

Development Project Network Group	Single Airport		Dual Airport	
	Government Projects	Projects Suggested by the Consultant	Government Projects	Projects Suggested by the Consultant
(1) Rail	-	-	3	-
(2) Elevated/Expressway (Motorway)	4	-	6	-
(3) At grade	19	(7)	27	(9)
(3.1) Main	7	(3)	8	(5)
(3.2) Collector/Feeder	12	(4)	19	(4)
Total	23	(7)	36	(9)
	30		45	

Source: The Consultant

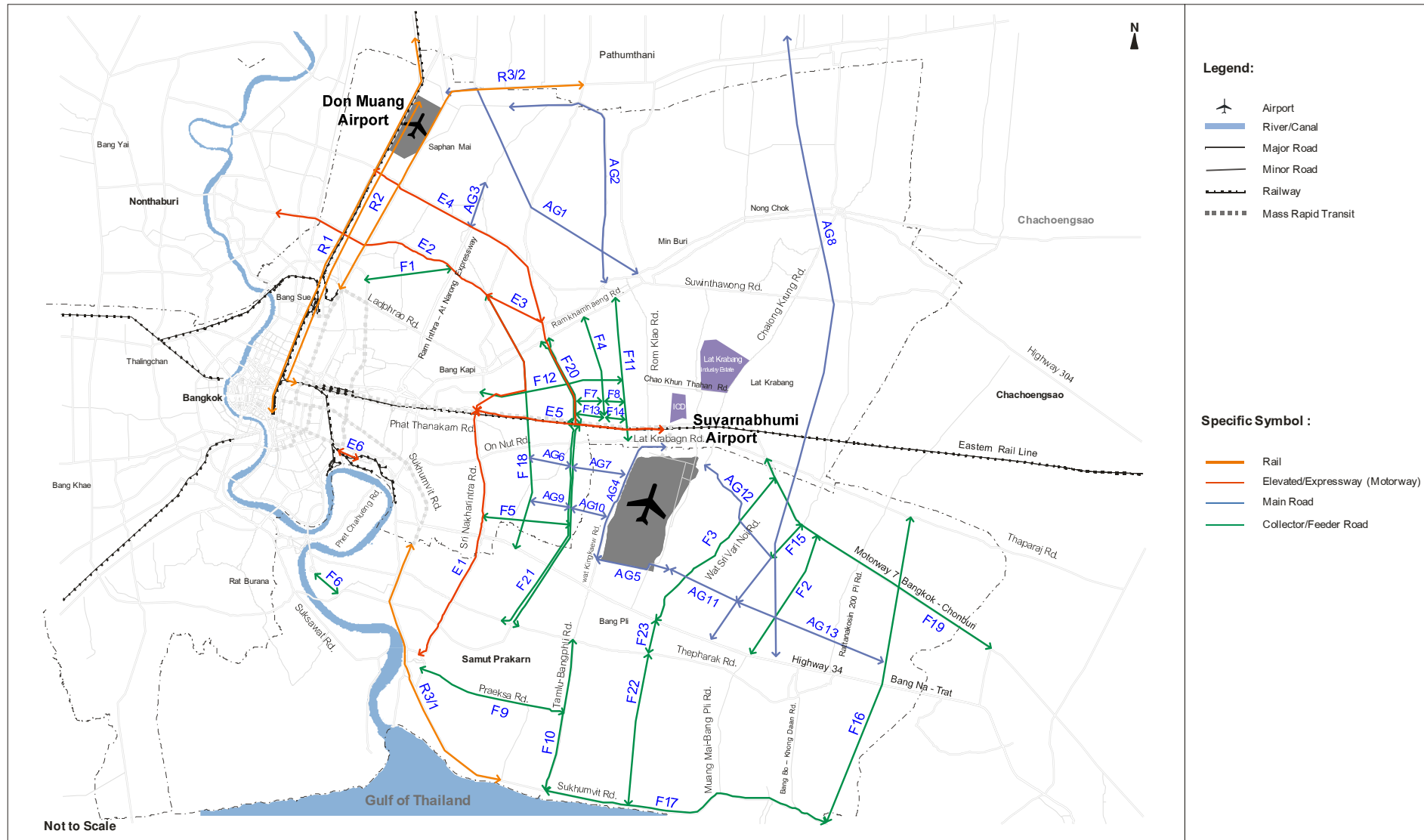
**Table 3.3-2 Transport Development Projects for Suvarnabhumi Aerotropolis
During the Period of 2009-2019**

Network Group	Project Code	Project	Distance (kms.)
Rail	R1	MRT Red Line (Rangsit - Hua Lamphong)	30.0
	R2	Extension of the Express MRT linking Suvarnabhumi and Don Muang Airports (Phayathai - Bang Sue - Don Muang Airport)	20.0
	R3	MRT Green Line Section 1 (R3/1) and Section 2 (R3/2)	41.5
Elevated /Expressway (Motorway)	E1*	Sri Nakhonintra - Bang Na - Samut Prakarn Expressway	14.0
	E2*	Northern Section of the Third Stage Expressway (Khae Rai - Kaset Navamintra - Motorway)	28.0
	E3	Elevated Highway linking Don Muang - Suvarnabhumi Airport (Navamintra Road - Outer Ring Road)	16.0
	E4	Elevated Highway linking Don Muang - Suvarnabhumi Airport (Ram Intra Road - Outer Ring Road)	9.5
	E5*	Extension of Suvarnabhumi Motorway Section 1 (M1-1)	12.5
	E6*	Extension of Suvarnabhumi Motorway Section 2 (M1-2)	1.5
At Grade-Main Road	AG1	Highway linking Don Muang - Minburi	18.5
	(AG2)	Improvement of Collector/Feeder Road linking Don Muang - Sai Mai - Hathairath - Rom Klao	15.0
	(AG3)	Improvement of Collector/Feeder Road linking Don Muang - Sai Mai - Sukhabhival 5 - Ram Intra - Rom Klao	2.0
	AG4*	Main Road parallel to Wat Kingkaew Road	9.0
	AG5*	Main Road linking to Kingkaew Road	4.5
	AG6*	New Main Road (Rom Klao - Eastern Ring Road Section 1, North Side)	3.0
	AG7*	New Main Road (Bang Pli - Suvarnabhumi Section 2, North Side)	2.5
	(AG8)*	The 3 rd Outer Ring Road	39.0
	AG9*	New Main Road (Rom Klao - Eastern Ring Road Section 1, South Side)	3.0
	AG10*	New Main Road (Bang Pli - Suvarnabhumi Section 2, South Side)	1.8
	AG11*	Truck route (Aerolane) into the Airport (South Side)	10.0
	(AG12)*	Truck route (Aerolane) into the Airport (North Side)	11.5
	(AG13)*	Main Road (Bang Bo - Bang Saothong)	10.5
At Grade-Collector/Feeder Road	F1	Highway linking Ratchadabhisek - Kaset Navamintra	6.0
	F2*	Road linking to Highway No.34	9.5
	F3*	Road (Highway No.7 - Highway No.34)	13.0
	F4*	Road linking Ram Kham Haeng Road	6.5
	F5*	Road linking Udomsuk - Eastern Outer Ring Road	3.5
	F6	Highway linking Industrial Ring Road and Kanchanabhisek Ring Road South	1.5
	F7*	Collector/Feeder Road (Outer Ring Road - Rom Klao Section 1, North Side)	1.5
	F8*	Collector/Feeder Road (Kheha Rom Klao - Rom Klao Section 2, North Side)	1.5
	F9	Expansion of Praeksa Road	9.5
	F10	Improvement of Highway No.3256 from 2 lanes to 8 lanes	10.0
	F11*	Road linking Ramkhamhaeng - Sukhumvit 77	10.0
	F12*	Road linking Sri Nakhonintra Road	9.0
	F13*	Collector/Feeder Road (Outer Ring Road - Rom Klao Section 1, South Side)	1.5
	F14*	Collector/Feeder Road (Kheha Rom Klao - Rom Klao Section 2, South Side)	1.5
	(F15)*	Road linking Highway No.7 - Highway No.34	2.5
	F16	Road linking Highway No.3 - Theparaj Road	20.5
	F17	Expansion of Sukhumvit Road (Bang Pli - Khlong Daan)	23.0
	F18*	Road linking Navamintra Road - Highway No.34	17.5
	F19*	Road along Highway No.7	16.5
	(F20)*	Road along Eastern Ring Road Left Side (Sukhabhival - Highway No.7)	6.0
	(F21)*	Road along Eastern Ring Road Right Side (Highway No.7 - Theparak)	15.0
	F22	Collector/Feeder Road (Sukhumvit - Theparak)	11.0
	(F23)*	New Road (Highway No.34 - Theparak Road)	2.0

Source: The Consultant

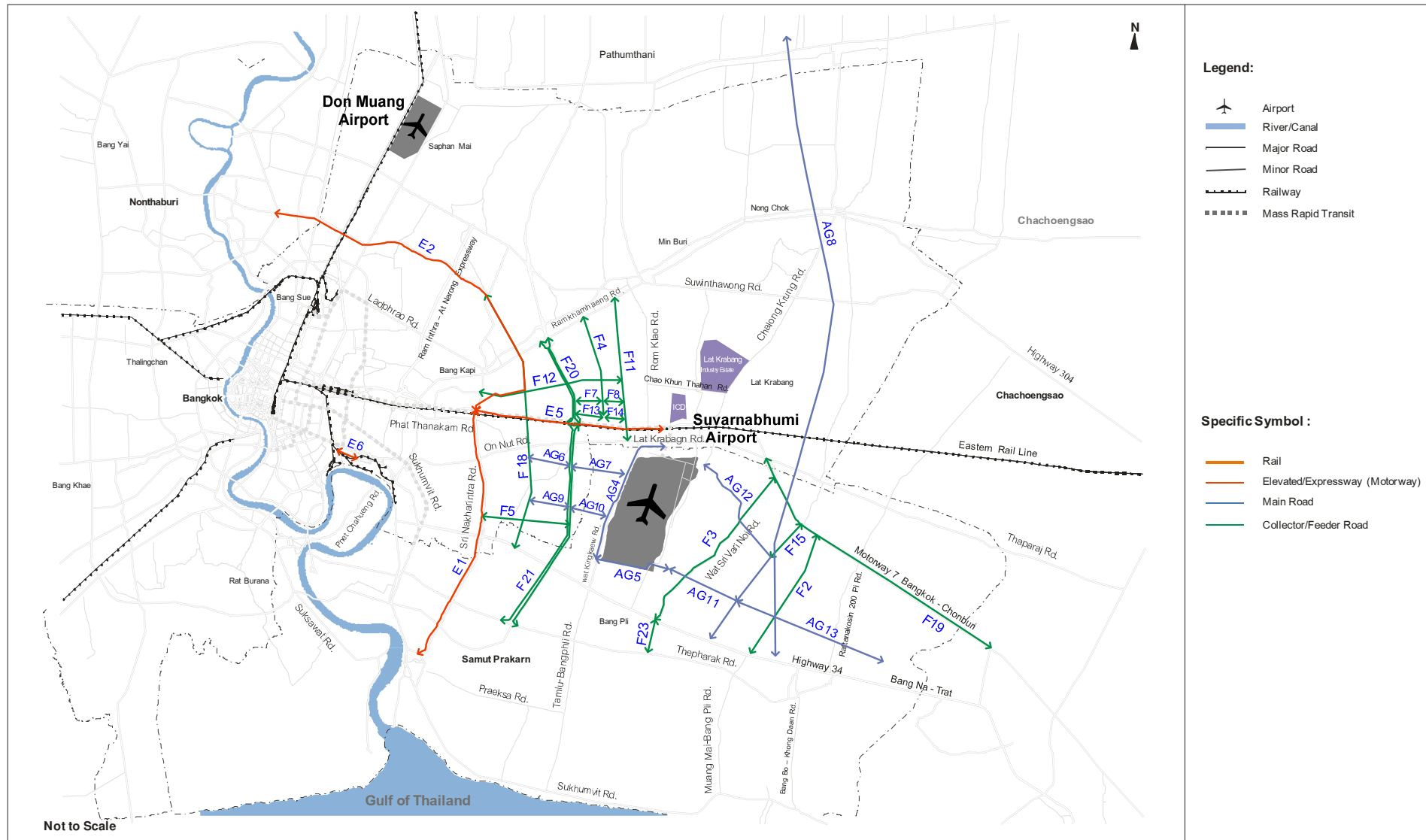
Note: (1) () Project suggested by the Consultant

(2) * Project suggested for both cases of Dual Airport and Single Airport, the other Projects suggested only for Dual Airport case



Source: The Consultant

Figure 3.3-1 Transport Network under Transport Development Master Plan for Suvarnabhumi Aerotropolis (Dual Airport)



Source: The Consultant

Figure 3.3-2 Transport Network under Transport Development Master Plan for Suvarnabhumi Aerotropolis (Single Airport)

3.3.2 Intelligent Transport System Planning

Intelligent Transport System (ITS) for Suvarnabhumi Airport should consist of three main components as follows:

- (1) The Airport Information and Management System (AIMS): to serve the passengers within the airport.
- (2) Information technology system and communication for the management of IT system for Cargo Free Zone for the management of duty free freight transferred through Thailand to other countries. The main system is divided into sub-systems in order to demonstrate the use of modern technology for Suvarnabhumi Airport.
- (3) The Intelligent Transport System in the area around Suvarnabhumi Airport: this is also essential and must be prepared and planned for procuring and installing the system to support the demand of passengers and freight transport coming to and going from Suvarnabhumi Airport at present and in the future.

The first and the second part are operated by the Airport itself. The first part is essential and is the most important. The second part is the system for facilitating the international freight transport. The third part is the system operated around Suvarnabhumi Airport and is the application of technology into the transport and traffic system especially the installation of the intelligent transport system. The third part needs to be composed with budget for the installation and maintenance of equipments, completeness of transport infrastructure, traffic routes, sizes and number of traffic lanes in each route, including volume of vehicles expected to use such routes, etc.

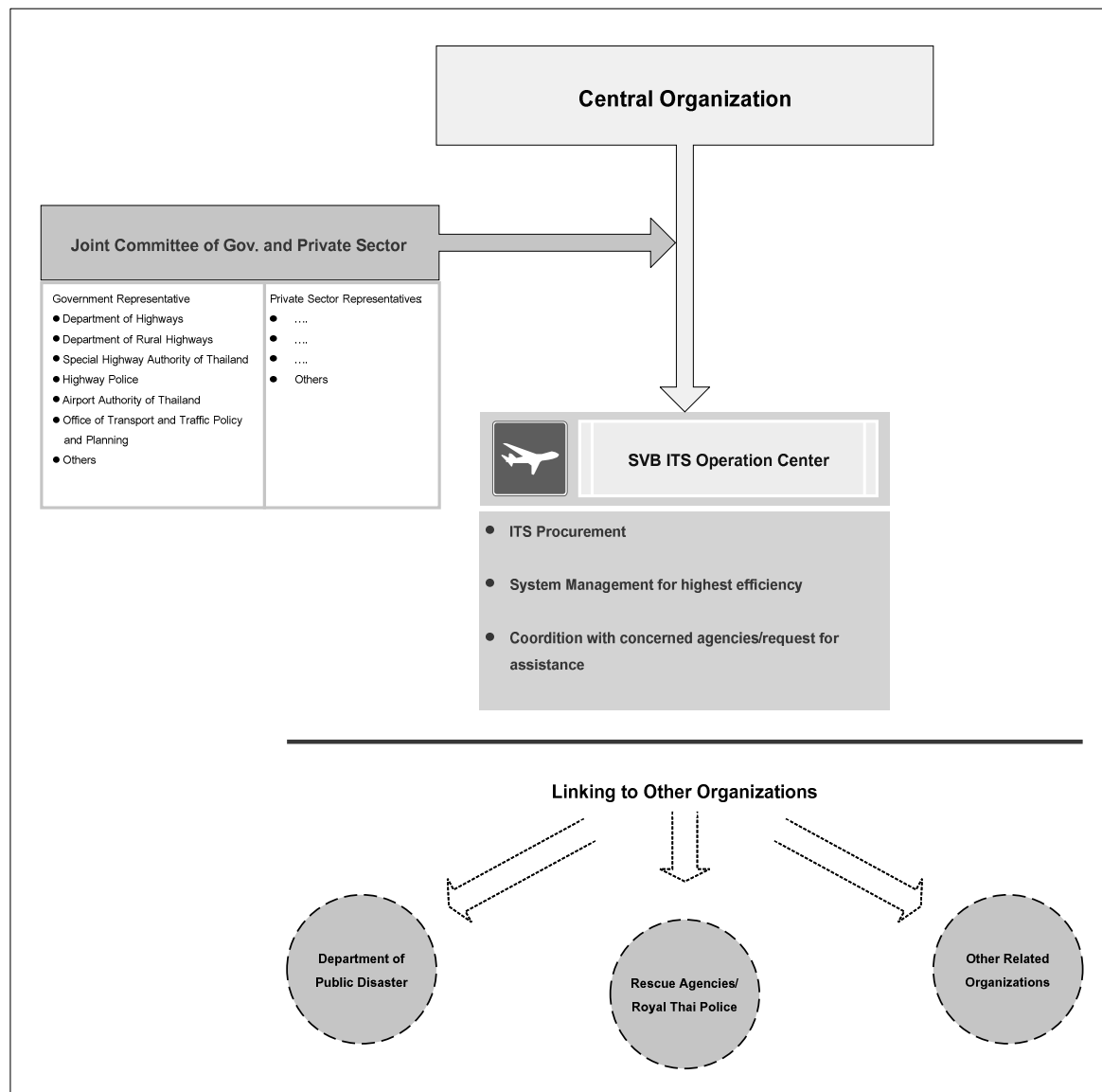
Application of the intelligent transport system in the surrounding area for Suvarnabhumi Aerotropolis during 2009-2019 is shown in Table 3.3-3.

Table 3.3-3 Intelligent Transport System Development Project for Suvarnabhumi Aerotropolis During the Period of 2009-2019

Period		ITS Development Section		
		First Section (2009-2013)	Second Section (2014-2019)	
		Fundamental Investment	Fundamental Investment	Improvement or Extension
Period of Construction Elevated /Expressway (Motorway) Networks And At Grade Highway	Starting Construction	- Passengers' information system - Traffic Management System - Electronic Data Interchange (EDI) - Construction of SVB ITS Operation Center	-	-
	Construction Partly Completed	-	- Incident Management Systems - Emergency System - Transit Signal Priority Additional System - Freeway Management System - Electronic Logistics System - Multimodal Freight Linking System	- Passenger Information System - Traffic Management System - Improve and extension of SVB ITS Operation Center
	Construction Completed	-	-	- Passengers' Information System - Traffic Management System - Incident Management Systems - Emergency System - Transit Signal Priority System Additional System - Freeway Management System
Project Investment Budget (Unit: Baht Million)		567	2,357	901
		3,825 *		

Source: The Consultant

Note: * For the Intelligent Transport System around Suvarnabhumi Airport only



Source: The Consultant

**Figure 3.3-3 Suvarnabhumi Intelligent Transport System Operation Center (SVB ITS Operation Center)
In the area of Suvarnabhumi Airport**

Application of ITS for the transport and traffic around Suvarnabhumi Airport requires a dedicated central organization. It is recommended that a new organization should be created under the umbrella of Ministry of Information and Communication Technology. Representatives from relevant government organizations and the private sector should be invited to be the joint committee to oversee this new organization. The organization is responsible both for the procurement of the intelligent transport system and for the management of the system in order to gain a highest efficiency and be able to coordinate and request for assistance from other agencies. The SVB ITS Operation Center should be constructed within the area of Suvarnabhumi Airport in order to have close control over the ITS system. Linking the center system (as shown in Figure 3.3-3) with other organizations having similar systems will reduce the expense each organization has to spend in the same area.

3.3.3 Urban Land Use Planning

Study for urban land use planning for passenger and freight transport demand is aimed at specifying the elements of urban development, i.e. areas and main transport routes that must be controlled for the development. The urban elements must correspond with the development of transport network in the area of Suvarnabhumi Aerotropolis.

Consequently, the regulation for controlling land use for the development of transport network should consider two important aspects; Land Use Control to protect nonconforming use, and Density/Bulk Control of buildings. Since the development of urban elements will affect the urban structure, land use development should be controlled in the following manner:

- 1) Nodes of transport emphasizing on (i) primary terminal for passengers from Suvarnabhumi Airport (NP:Node-Passenger) with the transit pattern of rail to rail, or rail to road, with the catchment area within 500 meters radius, and (ii) primary freight terminal for production and distribution activities in BMA (NF:Node-Freight). There will be control of additional construction and logistics activities in BMA Urban Plan. Such activities should be supported to be located within the area of industrial ring road. Its catchment area should be within 500 meters radius.
- 2) Main transport routes emphasizing on (i) main transport routes for passengers from Suvarnabhumi Airport (RP:Route-Passenger) with catchment area within 500 meters from the road side, and (ii) main transport routes for freight (RF:Route-Freight), and main routes linking production and distribution activities in BMA with the control over the additional construction and logistics activities within the BMA Urban Plan. Catchment area should cover the distance of 500 meters from the road side.

It is recommended that the suitable areas for construction of warehouses and distribution centers to support Suvarnabhumi Aerotropolis should be located within the areas of the outer ring road or the industrial ring road. Moreover, considering the current urban planning, additional suitable areas should be located in the industrial area of Samut Prakarn Province within the industrial ring road for both the old industrial and the new industrial groups including the area for newly developed industries, which coincide with the land use in the industrial area (Figure 3.3-4).



Source: The Consultant

Figure 3.3-4 Suitable Areas for Construction of Warehouses and Distribution Centers for Air Freight Passing Through Suvarnabhumi Airport in the Future

3.4 Appropriate Investment for Overall Transport Network

Analysis and recommendation of transport network linking Don Muang Airport and Suvarnabhumi Airport needs to take into consideration the following economic and environmental components:

3.4.1 Economic Evaluation of the Projects

Five scenarios have been identified in the Economic Evaluation in order to compare the cost and benefit in each scenario, and the different results among them. These scenarios can be considered as guidelines for further investment in the future. These Scenarios are:

Scenario 1 : opening both Don Muang Airport and Suvarnabhumi Airport (Dual Airport Policy) with 45 projects.

Scenario 2 : opening only Suvarnabhumi Airport (Single Airport Policy) with 30 projects.

Scenario 3 : opening both Don Muang Airport and Suvarnabhumi Airport without rail network development (Dual Airport-1) with 42 projects.

Scenario 4 : opening both Don Muang Airport and Suvarnabhumi Airport without elevated/expressway (motorway) network development (Dual Airport-2) with 39 projects.

Scenario 5 : opening both Don Muang Airport and Suvarnabhumi Airport without the at grade main highway network development (Dual Airport-3) with 32 projects

List of projects is shown in Table 4.2-2.

All the five scenarios have been considered by assessing the appropriate transport route network and the additional network recommended by the Consultant (project duration 30 years with 12% discount rate), Scenario 1 opening both airports with 45 development projects divided into 3 rail projects, 6 elevated/expressway (motorway) projects, and 36 at grade highway projects, has a total highest investment at Baht 358,058 million. Scenario 2 opening only Suvarnabhumi Airport with 30 development projects, has a total investment for the transport network at Baht 114,908 million. The third Scenario opening both airports without rail development projects has a total investment of Baht 161,907 million while Scenario 4 opening both airports without elevated/expressway (motorway) development project has a total investment of Baht 298,493 million. The last scenario, Scenario 5, opening both airports with no at grade highway development, has a total investment of Baht 323,184 million.

The analysis using 3 indicators, Net Present Value (NPV), Benefit-Cost Ratio (B/C Ratio) and the Economic Internal Rate of Return (EIRR), on the assumption that one project in the plan will open for servicing in 2012, all the Scenarios yields a good return since the EIRR will be between 18.96-46.62%. Scenario 3 gives a highest return at 46.62%, with Baht 619,413 million NPV and 6.60 B/C Ratio (discount rate at 12%).

However, analysis of Scenario 1, opening both Don Muang and Suvarnabhumi Airport (Dual Airport), has the rate of return at 28.15%, while Scenario 2, opening only Suvarnabhumi Airport (Single Airport) has a rate of return at 38.89%.

Moreover, such investment also results in savings in Vehicle Operating Cost (VOC), Value of Travel Time (VOT), and Accident Cost (ACC). The analysis can be summarized that Scenario 1 has the economic return at 28.15%, Scenario 2 has the economic return at 38.89%, and Scenario 3 has the economic return at 46.62%. However, Scenario 2 and Scenario 3 have no rail development projects making low construction investment and, thus, higher return.

By sensitivity analysis of all five Scenarios, with 20% increase in investment and 20% decrease in benefit, all the indicators of NPV, B/C Ratio and EIRR, are still high. It can be summarized that all the Scenarios are in economic terms worth investing in. However, the amount of return will depend on the investment in various projects that can be linked and coordinated appropriately into the network in each level (Table 3.4-1).

Table 3.4-1 Economic Evaluation of the Projects

Scenario	Economic Indicators	Base Case	Sensitivity Analysis of the Projects		
			20% Increase in Cost	20% Decrease in Benefit	20% Increase in Cost and 20% Decrease in Benefit
1	EIRR (%)	28.15	24.92	24.25	21.40
	NPV 12 % (Million Baht)	585,538	532,167	415,059	361,688
	B/C Ratio	3.19	2.66	2.56	2.13
2	EIRR (%)	38.89	34.73	33.87	30.30
	NPV 12 % (Million Baht)	401,489	386,686	306,388	291,585
	B/C Ratio	6.42	5.35	5.14	4.28
3	EIRR (%)	46.62	41.15	40.03	35.36
	NPV 12 % (Million Baht)	619,413	597,305	473,422	451,313
	B/C Ratio	6.60	5.50	5.28	4.40
4	EIRR (%)	23.48	20.62	20.02	17.49
	NPV 12 % (Million Baht)	310,463	265,361	203,268	158,166
	B/C Ratio	2.38	1.98	1.90	1.58
5	EIRR (%)	18.96	16.36	15.81	13.48
	NPV 12 % (Million Baht)	168,672	120,302	86,568	38,198
	B/C Ratio	1.70	1.41	1.36	1.13

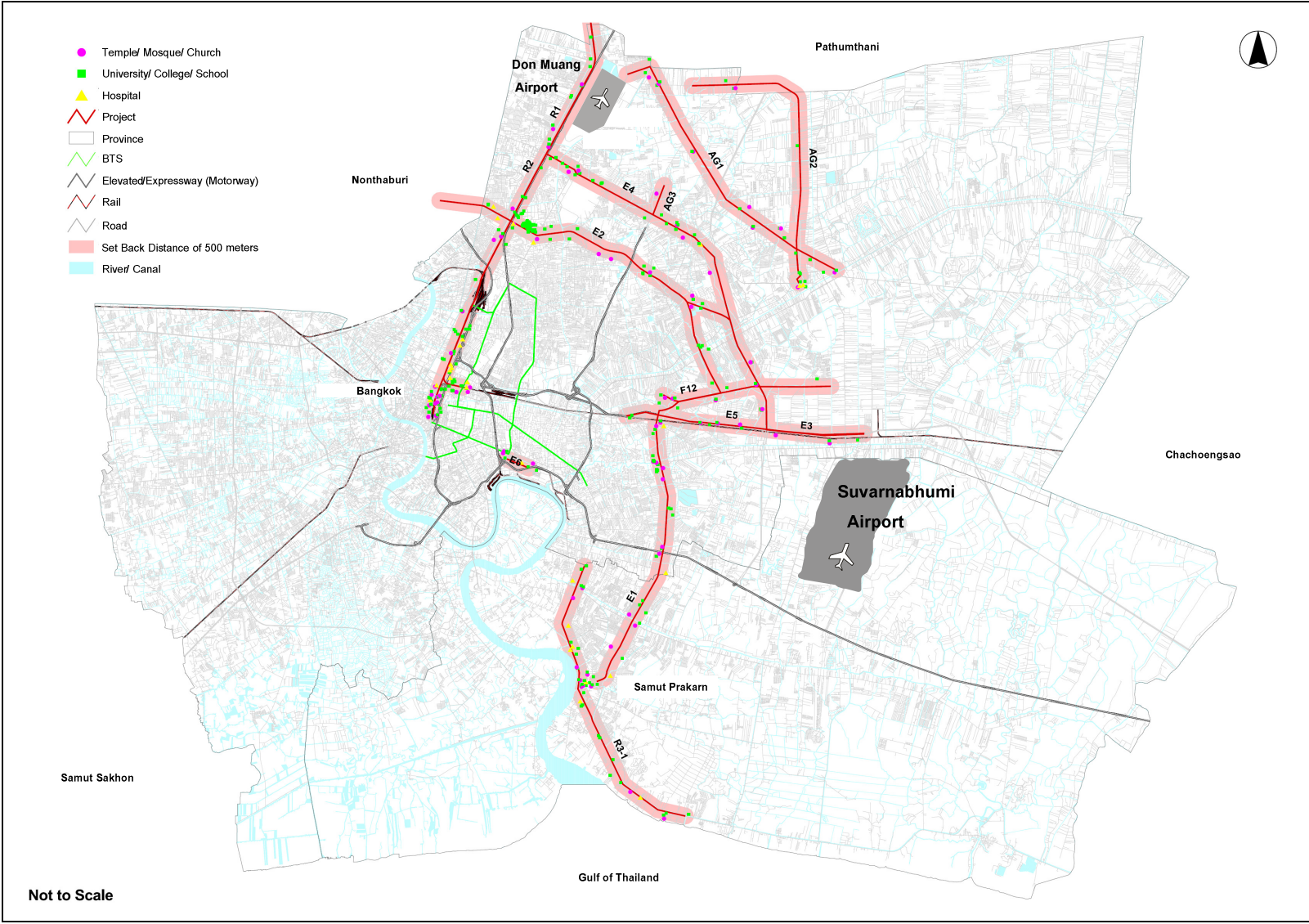
Source: The Consultant

3.4.2 Environmental Impact Assessment

A study of the environmentally-sound network pattern requires assessment of its environmental impact to the urban area. This leads to the establishment of future network development guidelines.

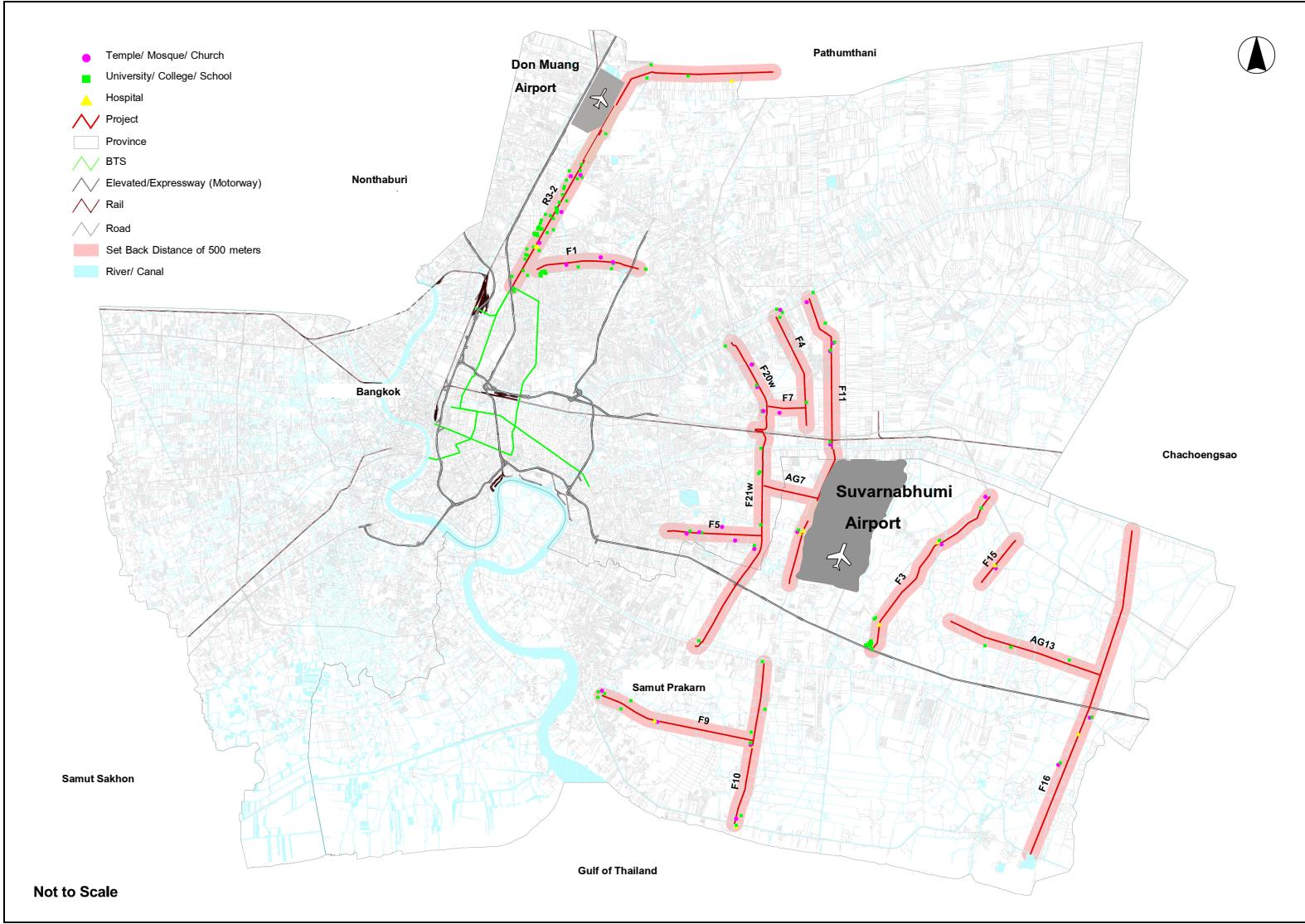
Environmental consideration covers 7 issues as (1) air pollution (2) noise and vibration (3) effect on land use (4) effect on drainage (5) evacuation and redemption (6) effect on health and risk of accident, and (7) effect on scenery, cultural sites and architectural landscape. Results of the assessment can be divided into 4 categories as high effect, moderate effect, less effect, and no effect.

Environmental constraint of the 45 projects was considered. Analysis on environment was divided into 46 routes i.e. Project R3 construction of MRT Green Line with 2 routes; Route R3/1 Bearing - Samut Prakarn (Bang Pu), and Route R3/2 Second Section Mo Chit - Saphan Mai (Lam Luk Ka). Summary of Assessments are shown in Figure 3.4-1 to 3.4-3.



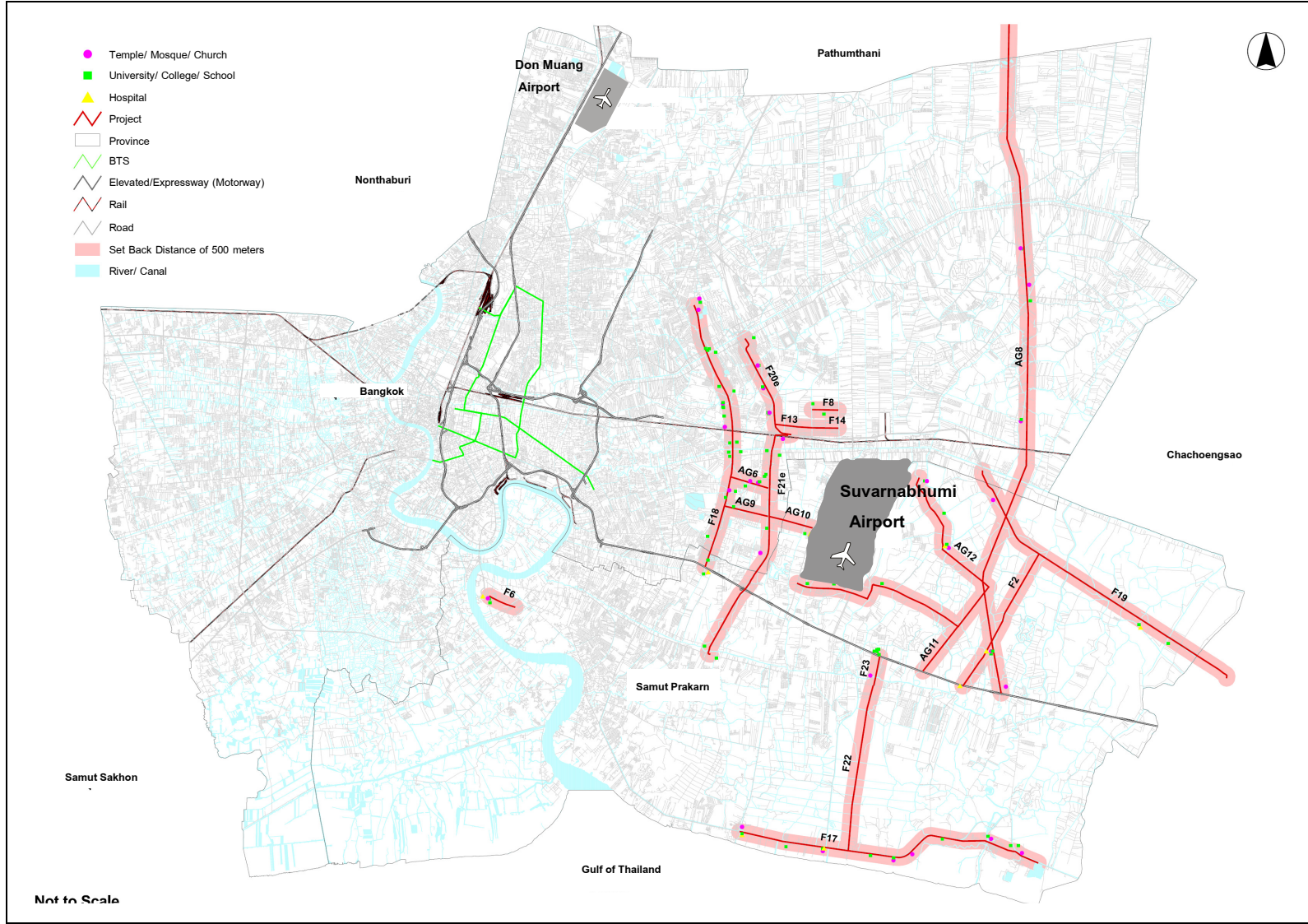
Source: The Consultant

Figure 3.4-1 Routes Expected to be Affected at High and Medium Levels (13 routes)



Source: The Consultant

Figure 3.4-2 Route Expected to be Affected at Medium and Low Levels (15 routes)



Source: The Consultant

Figure 3.4-3 Routes Expected to be Affected at Low Level and Routes without any Effect (18 routes)

The high to Moderate impact group consists of 13 routes, 9 of them are likely to require Environmental Impact Assessment Reports (to be submitted to Office of National Resources and Environment Policy and Planning prior to its implementation). The rest are proposed at-grade networks for DOH and BMA. Noise from these routes will seriously affect surrounding academic buildings within 20 meters distance. Mitigation measures can be applied either to the roads themselves, or to those who will be affected.

The moderate to low impact group comprises mainly primary and collector/feeder roads in the suburban area and in Samut Prakarn province. There are 15 routes in this group, in most cases this will create noise-pollution to the buildings within 20 meters and 50 meters distance from roadside. Mitigation measures can be applied either to the roads themselves, or to those who will be affected.

The rest of the routes (18 routes) fall in the Low to zero impact.

3.5 Financial Analysis of the Projects

For rail projects, most of the income comes from fare revenue while non-fare revenue comes from advertisement in the train, at stations and along the routes. Other sources of revenue comes from leasing of areas for business activities within the stations, and from park and ride areas (if any). Such non-fare revenue is estimated at 5% of revenue from fare collection. Elevated/expressway (motorway) projects earn revenue from toll collection and non-toll revenue similar to those of rail group. The out flows of cash are those for construction investment, maintenance, management and project operation. However, the financial feasibility can be considered in two scenarios.

Scenario 1 : Utilizing both Don Muang and Suvarnabhumi Airports (Dual Airport) with revenue from fare (rail) and toll (elevated/expressway (motorway))

Scenario 2 : Utilizing only Suvarnabhumi Airport (Single Airport) with revenue from toll (elevated/expressway (motorway))

Details are shown in Tables 3.5-1 and 3.5-2.

From the financial evaluation by the indicators of NPV, B/C Ratio, and Financial Internal Rate of Return (FIRR), both Scenarios are not worth investing since the NPV has a negative value, the B/C Ratio is less than 1, and the value of the FIRR is lower than 12% (calculated by weighted average cost of capital: WACC). However, separation analysis for each project shows that Project E6, the construction of additional Suvarnabhumi Expressway section 2 (M1-2) is the only economically feasible project due to its positive NPV, over 1 B/C Ratio, and over 12% FIRR.

Table 3.5-1 Financial Analysis Scenario 1

Network Group	Project Code	Present Value of Benefit (Million Baht)	Present Value of Cost (Million Baht)	Net Present Value (NPV) (Million Baht)	Benefit-Cost Ratio (B/C Ratio)	Financial Internal Rate of Return (FIRR) (%)
Rail	R1	13,728.22	57,201.06	-43,472.85	0.24	0.61
	R2	16,256.12	31,778.55	-15,522.43	0.51	6.20
	R3	33,009.01	95,974.03	-62,965.02	0.34	0.85
Elevated /Expressway (Motorway)	E1	1,221.25	7,051.65	-5,830.40	0.17	2.15
	E2	4,608.51	17,967.00	-13,358.49	0.26	3.64
	E3	3,544.41	4,349.55	-805.14	0.81	10.27
	E4	1,420.13	4,947.15	-3,527.02	0.29	5.63
	E5	3,161.08	6,825.40	-3,664.32	0.46	7.22
	E6	1,896.30	1,075.44	820.86	1.76	17.83
Total		78,845.03	227,169.84	-148,324.82	0.35	3.13

Source: The Consultant

Note: Scenario 1 : Dual Airport case

Table 3.5-2 Financial Analysis Scenario 2

Network Group	Project Code	Present Value of Benefit (Million Baht)	Present Value of Cost (Million Baht)	Net Present Value (NPV) (Million Baht)	Benefit-Cost Ratio (B/C Ratio)	Financial Internal Rate of Return (FIRR) (%)
Rail	R1	-	-	-	-	-
	R2	-	-	-	-	-
	R3	-	-	-	-	-
Elevated /Expressway (Motorway)	E1	1,615.35	7,051.65	-5,436.30	0.23	3.83
	E2	1,676.09	17,967.00	-16,290.91	0.09	1.01
	E3	-	-	-	-	-
	E4	-	-	-	-	-
	E5	3,606.79	6,825.40	-3,218.61	0.53	7.88
	E6	2,513.01	1,075.44	1,437.58	2.34	21.09
Total		9,411.24	32,919.49	-23,508.25	0.29	4.40

Source: The Consultant

Note: Scenario 2 : Single Airport case

3.6 Appropriate Investment Options for the Projects

Consideration of investment alternatives is based on the degree of private participation. In addition, each alternative is differentiated from others by options of revenue collection and allocation of risks. Details can be summarized as follows:

- Alternative 1: The government operates, collects revenue, and absorbs all investment risks
- Alternative 2: The private sector operates, collects revenue, absorbs all investment risks, and pays for constant annual concession fee throughout the concession period. By this alternative, the private

sector collects the revenue and maintains the system. In the case where the private sector makes a profit, such profit must be shared to the government in the form of concession fee.

- Alternative 3: The government develops the project, collects revenue, and thus absorbs investment risks. The government will then employ the private sector to operate and maintain the project. The government will pay for the administration and maintenance expenses. Payment will be fixed according to the agreement made between the government and the private sector. In practice, the payment made to the private sector will equal to the cost of administration plus the profit of administration.

Analyses of the above alternatives has been undertaken for the period of 30 years after completion of the construction of the 9 projects. Each case uses the same financial assumptions. The result of analyses for the investment options of Scenario 1 and Scenario 2 are shown in Table 3.6-1 and Table 3.6-2.

Table 3.6-1 Analysis of Investment Options for the Network, Scenario 1

No.	Investment Options	Financial Indicators	R1		R2		R3	
			Government	Private Sector	Government	Private Sector	Government	Private Sector
1	Government invests, operates and maintains the whole project	NPV 12 % (Million Baht)	-40,396.55	-	-17,073.90	-	-64,435.53	-
		NPV 9 % (Million Baht)	-39,737.91	-	-14,611.57	-	-63,619.35	-
		FIRR (%)	-0.09	-	4.78	-	-2.07	-
		B/C Ratio	0.06	-	0.39	-	0.04	-
		Payback Period	N.A.	-	22.00	-	N.A.	-
2	Government partly invests and gives concession to private sector	NPV 12 % (Million Baht)	-	0.74	-	3.51	-	0.71
		NPV 9 % (Million Baht)	-	1,840.04	-	4,442.85	-	1,799.80
		FIRR (%)	-	12.00*	-	12.00*	-	12.00*
		B/C Ratio	-	1.52	-	1.79	-	1.24
		Payback Period	-	7.00	-	13.00	-	2.00
3	Government invests and employs the private sector to operate and maintain the project	NPV 12 % (Million Baht)	-45,690.73	0.01	-18,139.18	0.01	-75,450.62	0.15
		NPV 9 % (Million Baht)	-44,317.93	527.88	-16,217.21	345.78	-74,540.61	1,181.84
		FIRR (%)	-0.85	12.00*	4.40	12.00*	-3.46	12.00*
		B/C Ratio	0.05	1.29	0.33	1.29	0.03	1.41
		Payback Period	N.A.	9.00	23.00	9.00	N.A.	11.00

Table 3.6-1 Analysis of Investment Options for the Network, Scenario 1 (Cont'd)

No.	Investment Options	Financial Indicators	E1		E2		E3	
			Government	Private Sector	Government	Private Sector	Government	Private Sector
1	Government invests, operates and maintains the whole project	NPV 12 % (Million Baht)	-5,993.89	-	-14,263.35	-	-1,781.73	-
		NPV 9 % (Million Baht)	-5,047.01	-	-13,748.64	-	-786.99	-
		FIRR (%)	2.27	-	3.31	-	6.32	-
		B/C Ratio	0.18	-	0.29	-	0.82	-
		Payback Period	28	-	24	-	13	-
2	Government partly invests and gives concession to private sector	NPV 12 % (Million Baht)	-	1,169.39	-	0.2	-	0.96
		NPV 9 % (Million Baht)	-	2,725.27	-	3,576.56	-	1,246.15
		FIRR (%)	-	16.06*	-	12.00*	-	12.00*
		B/C Ratio	-	1.81	-	1.34	-	1.52
		Payback Period	-	4	-	6	-	9
3	Government invests and employs the private sector to operate and maintain the project	NPV 12 % (Million Baht)	-6,032.17	0.01	-14,300.66	0.02	-1,820.89	0.01
		NPV 9 % (Million Baht)	-5,905.25	12.66	-13,806.93	15.51	-849.09	15.95
		FIRR (%)	2.18	12.00*	3.28	12.00*	6.27	12.00*
		B/C Ratio	0.17	1.32	0.28	1.34	0.8	1.3
		Payback Period	28	9	25	9	13	9

No.	Investment Options	Financial Indicators	E4		E5		E6	
			Government	Private Sector	Government	Private Sector	Government	Private Sector
1	Government invests, operates and maintains the whole project	NPV 12 % (Million Baht)	-3,859.08	-	-4,407.98	-	314.91	-
		NPV 9 % (Million Baht)	-3,469.35	-	-3,373.49	-	1,024.85	-
		FIRR (%)	4.31	-	5.26	-	9.63	-
		B/C Ratio	0.33	-	0.52	-	2.21	-
		Payback Period	22	-	20	-	10	-
2	Government partly invests and gives concession to private sector	NPV 12 % (Million Baht)	-	1,118.45	-	335.44	-	0.24
		NPV 9 % (Million Baht)	-	2,657.23	-	2,388.14	-	663.65
		FIRR (%)	-	16.52*	-	12.74*	-	12.00*
		B/C Ratio	-	2.14	-	1.53	-	1.65
		Payback Period	-	4	-	8	-	13
3	Government invests and employs the private sector to operate and maintain the project	NPV 12 % (Million Baht)	-3,894.23	0.01	-4,487.85	0.01	289.27	0.01
		NPV 9 % (Million Baht)	-3,522.67	11.59	-3,477.71	13.92	986.33	11.29
		FIRR (%)	4.25	12.00*	5.2	12.00*	9.58	12.00*
		B/C Ratio	0.32	1.31	0.51	1.32	2.16	1.19
		Payback Period	23	9	20	9	10	8

Source: The Consultant

Note : (1) * Government provides subsidy to private sector to enable financial return not less than the weighting average cost of capital (WACC) at 12%
(2) Scenario 1 is Dual Airport case

Table 3.6-2 Analysis of Investment Options for the Network, Scenario 2

No.	Investment Options	Financial Indicators	E1		E2		E5		E6	
			Government	Private Sector	Government	Private Sector	Government	Private Sector	Government	Private Sector
1	Government invests, operates and maintains the whole project	NPV 12 % (Million Baht)	-5,729.76	-	-16,442.98	-	-4,095.44	-	718.29	-
		NPV 9 % (Million Baht)	-5,524.93	-	-15,940.25	-	-2,888.43	-	1,734.45	-
		FIRR (%)	3.28	-	0.48	-	5.60	-	17.37	-
		B/C Ratio	0.25	-	0.10	-	0.59	-	3.04	-
		Payback Period	24.00	-	N.A.	-	19.00	-	8.00	-
2	Government partly invests and gives concession to private sector	NPV 12 % (Million Baht)	-	1,465.44	-	1,984.18	-	721.81	-	447.56
		NPV 9 % (Million Baht)	-	3,306.35	-	4,670.82	-	2,980.31	-	1,443.24
		FIRR (%)	-	16.63*	-	15.77*	-	13.55*	-	14.79*
		B/C Ratio	-	1.98	-	1.70	-	1.67	-	2.49
		Payback Period	-	4.00	-	4.00	-	7.00	-	11.00
3	Government invests and employs the private sector to operate and maintain the project	NPV 12 % (Million Baht)	-5,766.97	0.01	-16,491.39	0.02	-4,183.39	0.01	640.18	0.01
		NPV 9 % (Million Baht)	-5,581.49	12.66	-15,414.80	15.51	-3,002.06	13.92	1,615.89	28.89
		FIRR (%)	3.21	12.00*	0.39	12.00*	5.54	12.00*	16.76	12.00*
		B/C Ratio	0.24	1.32	0.10	1.34	0.57	1.32	2.90	1.38
		Payback Period	24.00	9.00	N.A.	9.00	19.00	9.00	9.00	10.00

Source: The Consultant

Note : (1) * Government provides subsidy to private sector to enable financial return not less than the weighting average cost of capital (WACC) at 12%

(2) Scenario 2 is Single Airport case

Analyses of the investment options help the government organization in making the decision of which investment option should be selected for certain projects. It was found from the financial analysis of the rail and elevated/expressway (motorway) projects that the return on investment of the government was lower than the weighted average cost of capital and the value of the NPV was negative for every project that was given a concession to the private sector, except the project E6, extension of Suvarnabhumi Motorway Section 2 (M1-2) for both cases.

In summary, both economic and financial analysis indicates that most rail and elevated/expressway (motorway) projects are likely to provide low financial return. Meanwhile, economic return of option 1 and 2 shows relatively good result, at 28.15% and 38.89% respectively. Their NPVs also show positive value. Financial result of such options however shows low return on investment. Consequently, it may be concluded that the above projects are not viable for solely private investment, and require government subsidy to allow each private investor to obtain FIRR of over 12% (Weighted Average Cost of Capital (WACC)=12%). As a result, only option 2 and 3 are recommended for further investigation. For option 2, the government and private sector investment cost; which should reduce the financial burden of the government, while the private sector can absorb some of the business and operational risks of the project. Nonetheless, the current global financial crisis may overshadow the attractiveness of some of the projects. In addition, previous experiences from PPPs projects have reflected the relatively high political risk for the private sector, for example Dindang-Don Muang Tollway, Bang Pa In-Pak Kred Expressway, and Bang Yai-Ban Pong Motorway.

For option 3, where the government totally invests in the project and gives a service contract to the private operator to operate and maintain the system, the key advantage is the relatively lower risk than option 2, as it requires no investment from such private operator. The private operator would receive a fixed service

payment and can therefore be highly attractive. Nonetheless, this option hardly reduces the financial burden from the government, as its investment is normally limited by public sector debt ceiling as well as its obligation to invest in other sector. Such limitation could result in project delay.

4. Master Plan and Action Plan of Transport Development for Suvarnabhumi Aerotropolis

4.1 Strategies for the Development of Transport System Network for Suvarnabhumi Aerotropolis and Supporting Mechanism of the Strategies

4.1.1 Strategies for the Development of Transport System Network

From the demand for passenger and freight transport, demand for infrastructure, and limitations of development, the strategies for the development of the transport system network can be formed as follows :

- 1) Develop the transport system network between the airports in case of using both airports for freight transfer and increase the capacity and efficiency of traveling by road linking from Phaholyothin Road- Lam Luk Ka Road or from Ram Intra Road to the eastern side of the Outer Ring Road.
- 2) Develop the transport system network for the development of an industrial center in the northern part of Bangkok such as the electronics industry, by developing the network from Phaholyothin Road to Suvarnabhumi Airport.
- 3) Develop the transport system network for developing the industrial centers in the western and southern parts of Bangkok, such as agro-industry, textile and clothing industry in the area of Phetkasem Road and adjacent areas by linking through the Ring Road on the southern side and the Industrial Ring Road to Suvarnabhumi Airport.
- 4) Develop the transport system network to link to the northeastern and northern areas of the country for agro-industry in order to link to the air transport center without passing through Bangkok. The routes that are needed to be improved are the Phaholyothin Road and the Eastern Ring Road.
- 5) Develop the transport system network to link to the Eastern Seaboard to support the multi-modal transport especially rail transport and water transport, and to support the expansion of specific industrial area, such as automotive industry in the industrial area on the Eastern Seaboard. The main routes for linking are, for example, the Motorway, Bang Na-Trat Highway and Suvintavong Road.

In addition to the system network development to strengthen the efficiency of the logistic process, there should be parallel development in the management and administration of the aviation center as follows:

- 1) Improve the information technology system for the completeness of the work and linkages from service users, Department of Customs, Airports of Thailand Public Company Limited, and warehouses in order to reduce documenting time and can be checked and controlled more efficiently.

- 2) Make revision for the appropriate rent and service fee in order to encourage the operators or their representatives to utilize the value added area of warehouses for assembling, packaging, and loading the freight to the containers before sending them to the warehouses.
- 3) Make revision of laws and regulations concerning the utilization of Free Zone Area so that they can be enforced efficiently and not being the problems of operation for the private sector users.

4.1.2 Supporting Mechanism of the Strategies

(1) Intelligent Transport System (ITS)

Selection of the Intelligent Transport System (ITS) technology for use in the future depends on factors of development of electronics technology, information and communication technology (ICT), and other related technologies. These factors and technologies must be considered according to suitability and coincidence between the need for the ITS, the available technology and the budget. The use of ITS in relation to transport of freight and passengers should moreover be within the objective framework as:

- Safety and security in operation
- Increasing of efficiency and productivity
- Easy and fast mobility and access through control points
- Savings in transport cost and transport pricing, reducing of noise and air pollution and supporting better environment for the society

(2) Urban and Regional Plan

The infrastructure development projects, especially those of the transport network, mainly induce development in the area. The implementation of the development projects on the transport network to support Suvarnabhumi Aerotropolis during 2009-2019, therefore, need to be well planned to support the expansion of future land use and must be complementary with the roles of the urban elements and the management of the town plan of Suvarnabhumi Aerotropolis.

Analysis on urban elements was carried out to the recommended transport network development in the area by considering the significance of the town structure, i.e. the routes and assembling or dispersing points of the economic activities that may be affected or may affect the land development especially along the transport routes or around the major centers of transport, in order to regulate the land use and to set up guidelines for further development of the area. The urban elements can be divided into 2 types : (1) Node of transport, and (2) Route of transport. Since these urban elements have the influences upon the town structure, it is necessary to control the land use development and regulate the direction of area development.

The regulation controlling the direction of land use development for the transport system network must consist of 2 main parts: (1) the land use control to prevent nonconforming use by specifying the activities

allowed to exist within each type of land use, and (2) density/bulk control comprising (i) floor area ratio (FAR), (ii) open space ratio (OSR), (iii) set back distance of building from the edge of land plot, and (iv) restriction on building height for each type of land use.

4.2 Transport Development Master Plan for Suvarnabhumi Aerotropolis for the next Ten Years (2009-2019)

4.2.1 Overall Network under Transport Development Master Plan for Suvarnabhumi Aerotropolis

The Master Plan of Transport Development for Suvarnabhumi Aerotropolis in the next Ten years focuses on network development to enhance Dual Airport Policy. The recommended transport network under this Master Plan consists of 45 projects. These are; (1) 3 rail projects, (2) 6 elevated/expressway (motorway) projects, and (3) 36 at-grade road projects of which 13 are main roads and 23 are collector/feeder roads. Key target of the Master Plan is aimed at the opening of service of all the projects not later than the year 2019.

The investment on the network requires total budget of Baht 358,058 million. Detail of the investment budget is shown in Table 4.2-1. Details of overall networks and project investment under the Master Plan are shown in Figure 3.3-1 to 3.3-2 and Table 4.2-2.

Detailed Master Plan is shown in a separate report, Transport Development Master Plan for Suvarnabhumi Aerotropolis.

**Table 4.2-1 Summary of Investment Budget under Transport Development Master Plan
for Suvarnabhumi Aerotropolis**

Unit: Million Baht

Type of Project	Yearly Investment under the Master Plan										
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Rail Network	13,998	41,621	43,627	28,836	14,418	9,612	-	11,010	17,616	15,414	-
Elevated/Expressway (Motorway) Network	-	12,125	16,251	18,444	7,817	4,929	-	-	-	-	-
Main Road Network	-	6,030	10,971	12,365	4,566	944	-	-	-	-	-
Collector/Feeder Road Network	-	4,228	17,298	20,845	14,829	-	-	1,026	3,592	3,592	2,053
Total	13,998	64,004	88,147	80,490	41,630	15,486	-	12,036	21,208	19,006	2,053

Source: The Consultant

Table 4.2-2 Overall Network and Investment under Transport Development Master Plan for Suvarnabhumi Aerotropolis

Network Group	Project Code	Project	Responsible Organization	Yearly Investment under the Master Plan											Total Investment (Million Baht)	Construction Period (Years)
				2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019		
Rail	R1	MRT Red Line (Rangsit - Hua Lamphong)	SRT	-	12,651	15,814	18,977	9,489	6,326	-	-	-	-	-	63,257	5
	R2	Extension of the Express MRT linking Suvarnabhumi and Don Muang Airports (Phayathai - Bang Sue - Don Muang Airport)	SRT	-	6,573	8,216	9,859	4,930	3,286	-	-	-	-	-	32,864	5
	R3	MRT Green Line Section 1 (R3/1) and Section 2 (R3/2)	BMA / BTS	13,998	22,396	19,597	-	-	-	-	11,010	17,616	15,414	-	100,031	6
Elevated /Expressway (Motorway)	E1*	Sri Nakharintra - Bang Na - Samut Prakarn Expressway	EXAT	-	2,015	2,519	3,023	1,511	1,008	-	-	-	-	-	10,076	5
	E2*	Northern Section of the Third Stage Expressway (Khae Rai - Kaset Navamintra - Motorway)	EXAT	-	5,279	6,599	7,919	3,960	2,640	-	-	-	-	-	26,397	5
	E3	Elevated Highway linking Don Muang - Suvarnabhumi Airport (Navamintra Road - Outer Ring Road)	DOH	-	1,174	1,468	1,761	881	587	-	-	-	-	-	5,871	5
	E4	Elevated Highway linking Don Muang - Suvarnabhumi Airport (Ram Intra Road - Outer Ring Road)	DOH	-	1,390	1,738	2,085	1,043	695	-	-	-	-	-	6,951	5
	E5*	Extension of Suvarnabhumi Motorway Section 1 (M1-1)	EXAT	-	2,266	3,626	3,173	-	-	-	-	-	-	-	9,065	3
	E6*	Extension of Suvarnabhumi Motorway Section 2 (M1-2)	EXAT	-	-	302	483	423	-	-	-	-	-	-	1,208	3
At Grade-Main Road	AG1	Highway linking Don Muang - Minburi	DOH	-	1,689	2,702	2,365	-	-	-	-	-	-	-	6,756	3
	(AG2)	Improvement of Collector/Feeder Road linking Don Muang - Sai Mai - Hathairath - Rom Klao	DOH	-	738	1,182	1,034	-	-	-	-	-	-	-	2,954	3
	(AG3)	Improvement of Collector/Feeder Road linking Don Muang - Sai Mai - Sukhabhival 5 - Ram Intra - Rom Klao	DOH	-	74	119	104	-	-	-	-	-	-	-	297	3
	AG4*	Main Road parallel to Wat Kingkaew Road	DRR	-	1,071	1,714	1,500	-	-	-	-	-	-	-	4,285	3
	AG5*	Main Road linking to Kingkaew Road	DRR	-	569	910	797	-	-	-	-	-	-	-	2,276	3
	AG6*	New Main Road (Rom Klao - Eastern Ring Road Section 1, North Side)	BMA	-	-	120	193	168	-	-	-	-	-	-	481	3
	AG7*	New Main Road (Bang Pli - Suvarnabhumi Section 2, North Side)	DRR	-	-	173	277	242	-	-	-	-	-	-	692	3
	(AG8)*	The 3 rd Outer Ring Road	DOH	-	1,888	2,360	2,832	1,416	944	-	-	-	-	-	9,440	5
	AG9*	New Main Road (Rom Klao - Eastern Ring Road Section 1, South Side)	BMA	-	-	-	267	178	-	-	-	-	-	-	445	2
	AG10*	New Main Road (Bang Pli - Suvarnabhumi Section 2, South Side)	DRR	-	-	-	294	196	-	-	-	-	-	-	490	2
	AG11*	Truck route (Aerolane) into the Airport (South Side)	DRR	-	-	543	868	760	-	-	-	-	-	-	2,171	3
	(AG12)*	Truck route (Aerolane) into the Airport (North Side)	DRR	-	-	556	889	778	-	-	-	-	-	-	2,223	3
	(AG13)*	Main Road (Bang Bo - Bang Saethong)	DRR	-	-	592	946	828	-	-	-	-	-	-	2,366	3

Table 4.2-2 Overall Network and Investment under Transport Development Master Plan for Suvarnabhumi Aerotropolis (Cont'd)

Network Group	Project Code	Project	Responsible Organization	Yearly Investment under the Master Plan											Total Investment (Million Baht)	Construction Period (Year)
				2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019		
At Grade- Collector/Feeder Road	F1	Highway linking Ratchadabhisek - Kaset Navamintra	DOH	-	-	2,007	3,211	2,810	-	-	-	-	-	-	8,028	3
	F2*	Road linking to Highway No.34	DRR	-	-	459	735	643	-	-	-	-	-	-	1,837	3
	F3*	Road (Highway No.7 - Highway No.34)	DRR	-	198	693	693	396	-	-	-	-	-	-	1,980	4
	F4*	Road linking Ram Kham Haeng Road	BMA	-	419	670	586	-	-	-	-	-	-	-	1,675	3
	F5*	Road linking Udomsuk - Eastern Outer Ring Road	BMA	-	606	404	-	-	-	-	-	-	-	-	1,010	2
	F6	Highway linking Industrial Ring Road and Kanchanabhisek Ring Road South	DOH	-	408	272	-	-	-	-	-	-	-	-	680	2
	F7*	Collector/Feeder Road (Outer Ring Road - Rom Klao Section 1, North Side)	BMA	-	78	52	-	-	-	-	-	-	-	-	130	2
	F8*	Collector/Feeder Road (Kheha Rom Klao - Rom Klao Section 2, North Side)	BMA	-	78	52	-	-	-	-	-	-	-	-	130	2
	F9	Expansion of Praeksa Road	DOH	-	212	743	743	424	-	-	-	-	-	-	2,122	4
	F10	Improvement of Highway No.3256 from 2 lanes to 8 lanes	DOH	-	756	2,646	2,646	1,512	-	-	-	-	-	-	7,560	4
	F11*	Road linking Ramkhamhaeng - Sukhumvit 77	BMA	-	-	1,155	1,848	1,617	-	-	-	-	-	-	4,620	3
	F12*	Road linking Sri Nakharintra Road	BMA	-	-	741	1,185	1,037	-	-	-	-	-	-	2,963	3
	F13*	Collector/Feeder Road (Outer Ring Road - Rom Klao Section 1, South Side)	BMA	-	-	-	78	52	-	-	-	-	-	-	130	2
	F14*	Collector/Feeder Road (Kheha Rom Klao - Rom Klao Section 2, South Side)	BMA	-	-	-	78	52	-	-	-	-	-	-	130	2
	(F15)*	Road linking Highway No.7 - Highway No.34	DRR	-	-	-	290	193	-	-	-	-	-	-	483	2
	F16	Road linking Highway No.3 - Theparaj Road	DRR	-	-	1,183	1,892	1,656	-	-	-	-	-	-	4,731	3
	F17	Expansion of Sukhumvit Road (Bang Pli - Khlong Daan)	DOH	-	-	1,064	1,702	1,490	-	-	-	-	-	-	4,256	3
	F18*	Road linking Navamintra Road - Highway No.34	BMA	-	1,474	5,159	5,159	2,948	-	-	-	-	-	-	14,740	4
	F19*	Road along Highway No.7	DRR	-	-	-	-	-	-	-	233	815	815	466	2,329	4
	(F20)*	Road along Eastern Ring Road Left Side (Sukhabhival - Highway No.7)	DRR	-	-	-	-	-	-	-	76	267	267	153	763	4
	(F21)*	Road along Eastern Ring Road Right Side (Highway No.7 - Theparak)	DRR	-	-	-	-	-	-	-	226	793	793	453	2,265	4
	F22	Collector/Feeder Road (Sukhumvit - Theparak)	DRR	-	-	-	-	-	-	-	436	1,524	1,524	871	4,355	4
	(F23)*	New Road (Highway No.34 - Theparak Road)	DRR	-	-	-	-	-	-	-	55	193	193	110	551	4

Note : (1) () Project suggested by the Consultant (2) * Project suggested for both cases of Dual Airport and Single Airport, the another Projects suggested only for Dual Airport case
(3) SRT- State Railway of Thailand, BMA- Bangkok Metropolitan Administration, EXAT- Expressway Authority of Thailand, DOH- Department of Highways, DRR- Department of Rural Roads

4.2.2 Management of Investment to support Suvarnabhumi Aerotropolis

The requirement for investment for the development of transport network will be relatively high during the years 2009-2014 and 2016-2019. The highest requirement will be Baht 88,147 million in 2011, as shown in Table 4.2-1. The possibility of being allocated the adequate amount of budget is therefore low. The government, on the other hand, needs to attract private funding for the projects that can be made commercially viable.

Private sector participation in public sector investment can be in various forms. Selection of the appropriate investment option should take in consideration the magnitude of the investment, government policy, government's financial liquidity, domestic investment risks, as well as the capability of domestic and international financial market. In this case, key alternatives are:

- Public-Private Partnerships (PPPs), which focuses on risk sharing between government and private sector, can be applied through various patterns, such as BOT (Build-Operate-Transfer)¹, BOOT (Build-Own-Operate-Transfer)², BTO (Build-Transfer-Operate)³. Most of the PPPs projects in Thailand fall under BTO pattern, such as Blue Line MRT System, in which the government absorbed majority part of the investment, Green Line BTS, Bang Pa-in – Pak Kred Expressway, etc. These PPPs patterns take on part of the investment burden as well as risks from the government in the long term. On the other hand, when the country's investment climate and domestic financial market capability is in poor condition, the project is likely to face delay.
- The government solely invests in project implementation, and employs a private operator through a management contract. This alternative may be undertaken in a shorter period of time than the above, as the government gains total control of the project implementation. Delay however is possible in case that government financial liquidity is low. In addition, this alternative provides limited risk transferred to the private sector, while the government still absorbs most of the direct and contingency risks, e.g. revenue risk (as private operator will be paid in fixed term by the government, instead of collecting its revenue through fare or toll), political risk (as the contract between the government and private operator will only be procurement contract, instead of concession contract), risk of cost over-run, etc.

For transport network development under this Master Plan, financial evaluation shows that the PPPs approach should be appropriate for rail and elevated/expressway (motorway) projects. It is therefore recommended that BTO pattern is applied for most of the elevated/expressway (motorway) projects. Meanwhile, for rail projects, higher investment and risks can be anticipated. It is recommended that the

¹ By this pattern, private sector is responsible for investment in design and construction of project, operation and maintenance of project within the agreed period of time, and transferring all assets to the project owner at the end of the contract.

² Same as BOT, but private sector has the ownership right over project assets after completion of construction.

³ Private sector is responsible for investment in design and construction of project. Once construction completes, all assets must be transferred to the government as agreed in the concession contract. Private sector will then be given the right to operate and maintain the project throughout the contract period.

government is involved in part of the investment. A previous example of this approach is the Blue Line MRT System, where the government absorbed all the land acquisition and construction costs. This helped increasing the financial return, as well as the attractiveness, of the project. This approach may be necessary for the rest of the elevated /expressway (motorway) projects, which are low in financial return, but high in economic benefit. The recommended investment options and investment plan for rail and elevated/expressway (motorway) projects is shown in table 4.2-3 and 4.2-4.

Table 4.2-3 Required investment from the Government and Private Sector in Rail and Elevated /Expressway (Motorway) Projects under Transport Development Master Plan for Suvarnabhumi Aerotropolis

Unit: Million Baht

Project	Investment Pattern		Years											Total
			2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
R1	Joint Investment	Government	-	10,687	13,359	16,031	8,016	5,343	-	-	-	-	-	53,436
		Private Sector	-	1,964	2,455	2,946	1,473	982	-	-	-	-	-	9,820
R2	Joint Investment	Government	-	4,626	5,782	6,939	3,470	2,313	-	-	-	-	-	23,130
		Private Sector	-	1,947	2,434	2,920	1,460	974	-	-	-	-	-	9,735
R3	Joint Investment	Government	9,389	15,022	13,145	-	-	-	-	8,568	13,708	11,995	-	71,827
		Private Sector	4,609	7,374	6,452	-	-	-	-	2,442	3,907	3,419	-	28,203
E1	BTO	Government	-	-	-	-	-	-	-	-	-	-	-	-
		Private Sector	-	2,015	2,519	3,023	1,511	1,008	-	-	-	-	-	10,076
E2	Joint Investment	Government	-	1,291	1,614	1,937	968	646	-	-	-	-	-	6,456
		Private Sector	-	3,988	4,985	5,982	2,992	1,994	-	-	-	-	-	19,941
E3	Joint Investment	Government	-	510	638	765	383	255	-	-	-	-	-	2,551
		Private Sector	-	664	830	996	498	332	-	-	-	-	-	3,320
E4	BTO	Government	-	-	-	-	-	-	-	-	-	-	-	-
		Private Sector	-	1,390	1,738	2,085	1,043	695	-	-	-	-	-	6,951
E5	BTO	Government	-	-	-	-	-	-	-	-	-	-	-	-
		Private Sector	-	2,266	3,626	3,173	-	-	-	-	-	-	-	9,065
E6	BTO	Government	-	-	-	-	-	-	-	-	-	-	-	-
		Private Sector	-	-	302	483	423	-	-	-	-	-	-	1,208

Source: The Consultant

Table 4.2-4 Summary of the Investment from the Government and Private Sector in Rail and Elevated/Expressway (Motorway) Projects under Transport Development Master Plan for Suvarnabhumi Aerotropolis

Unit: Million Baht

Type of project/responsible parties		Years											Total
		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
Rail	Government	9,389	30,335	32,286	22,970	11,486	7,656	-	8,568	13,708	11,995	-	148,393
	Private Sector	4,609	11,285	11,341	5,866	2,933	1,956	-	2,442	3,907	3,419	-	47,758
Elevated /Expressway (Motorway)	Government	-	1,801	2,252	2,702	1,351	901	-	-	-	-	-	9,007
	Private Sector	-	10,323	14,000	15,742	6,467	4,029	-	-	-	-	-	50,561
Total	Government	9,389	32,136	34,538	25,672	12,837	8,557	-	8,568	13,708	11,995	-	157,400
	Private Sector	4,609	21,608	25,341	21,608	9,400	5,985	-	2,442	3,907	3,419	-	98,319

Source: The Consultant

4.2.3 Transport Network Development under Single Airport Policy

In the implementation of the strategies for network development in accordance with Dual Airport Policy, there may be the situations creating problems and obstacles resulting in changes to the status of Suvarnabhumi Aerotropolis. The development of Suvarnabhumi Aerotropolis contains several mega-projects with complexities and risks. The strategic planning, therefore, requires the alternatives to be prepared to meet the resulting changes.

The alternative strategies in the case of the development of Suvarnabhumi Aerotropolis are planned for the possible changes in case the full development cannot be realized. These changes may be derived from aviation policy, airport management policy, or investment policy on supporting infrastructure. Besides the normal situation, the situation most likely to occur is the implementation of a Single Airport Policy instead of the current Dual Airport Policy.

Under Single Airport Policy, major transport linkages between Suvarnabhumi Airport and Don Muang Airport are not required. The strategy for transport network development emphasizes the link between Suvarnabhumi Airport and Bangkok, as well as area around the Airport. This will substantially reduce the amount of investment required. Some investment projects can be taken out of the Master Plan, for example, all the rail projects, as well as expressway projects linking Suvarnabhumi Airport and Don Muang Airport. This reduces the amount of investment to Baht 114,908 million (Table 4.2-5). Details of 30 projects are however in accordance with Scenario 2 of financial analysis.

Table 4.2-5 Summary of the Investment under Single Airport Policy (Single Airport)

Unit: Million Baht

Project	Yearly Investment Under the Master Plan										
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Rail	-	-	-	-	-	-	-	-	-	-	-
Elevated /Expressway (Motorway)	-	9,561	13,046	14,598	5,894	3,647	-	-	-	-	-
Main Road	-	3,529	6,968	8,862	4,566	944	-	-	-	-	-
Collector/Feeder Road	-	3,609	12,030	13,297	8,449	-	-	591	2,068	2,068	1,182
Total	-	16,698	32,044	36,757	18,909	4,591	-	591	2,068	2,068	1,182

Source: The Consultant

4.3 Transport Development Action Plan for Suvarnabhumi Aerotropolis for the next Five Years (2009-2013)

Forty projects for Dual Airport Policy (Table 4.3-2 and Figure 4.3-1) and twenty six projects for Single Airport Policy (Table 4.3-2 and Figure 4.3-2) should proceed to implementation under the 5-year Action Plan. After the end of the plan, thirty three routes (Dual Airport case) and twenty three routes (Single Airport case) can be opened for servicing. These projects are under the responsibility of 5 organizations, namely State Railway of Thailand, Bangkok Metropolitan Administration, Expressway Authority of Thailand, Department of

Highways, and Department of Rural Roads. The investment on the network requires a total budget of Baht 288,275 million and Baht 96,851 million for Dual Airport Policy and Single Airport Policy respectively.

In practice, 3 rail projects and 6 elevated/expressway (motorway) projects require preparation periods longer than the other types of projects. As these are large-scale projects which require private sector participation (according to the Act on Private Participation in State Undertaking, B.E.2535), their planning and implementation period normally take longer than other projects. Project preparation, in such cases requires detailed planning in terms of engineering, economic viability, environmental impact, investment options, terms and conditions for private participation, etc. This also requires project owners to appoint private investor/operator selection committee. Then the draft concession agreement will need to be submitted to Attorney General's Office for final revision. The whole process, in practice, will last longer than one year.

The study recommends a Public-Private Partnerships (PPPs) approach for rail projects and the elevated /expressway (motorway) projects, since these projects require high amount of investment and the return of investment is relatively low. The government must share a high proportion of the investment in these projects, in order to attract the interest of private sector. Joint investment with the private sector helps reduce the investment burden of the government.

The amount of investment that should be supported by the government for each type of project is shown in Table 4.3-1.

Table 4.3-1 Required Investment from the Government for Rail and Elevated /Expressway (Motorway) projects

Unit: Million Baht

Project	Years				
	2009	2010	2011	2012	2013
Rail	9,389	30,335	32,286	22,970	11,486
Elevated /Expressway (Motorway)	-	1,801	2,252	2,702	1,351
Total	9,389	32,136	34,538	25,672	12,837

Source: The Consultant

Details of the Action Plan are incorporated in Transport Development Action Plan for Suvarnabhumi Aerotropolis Report.

Table 4.3-2 Details of Projects, Responsible Organizations, and Investment Pattern under Transport Development Action Plan for Suvarnabhumi Aerotropolis

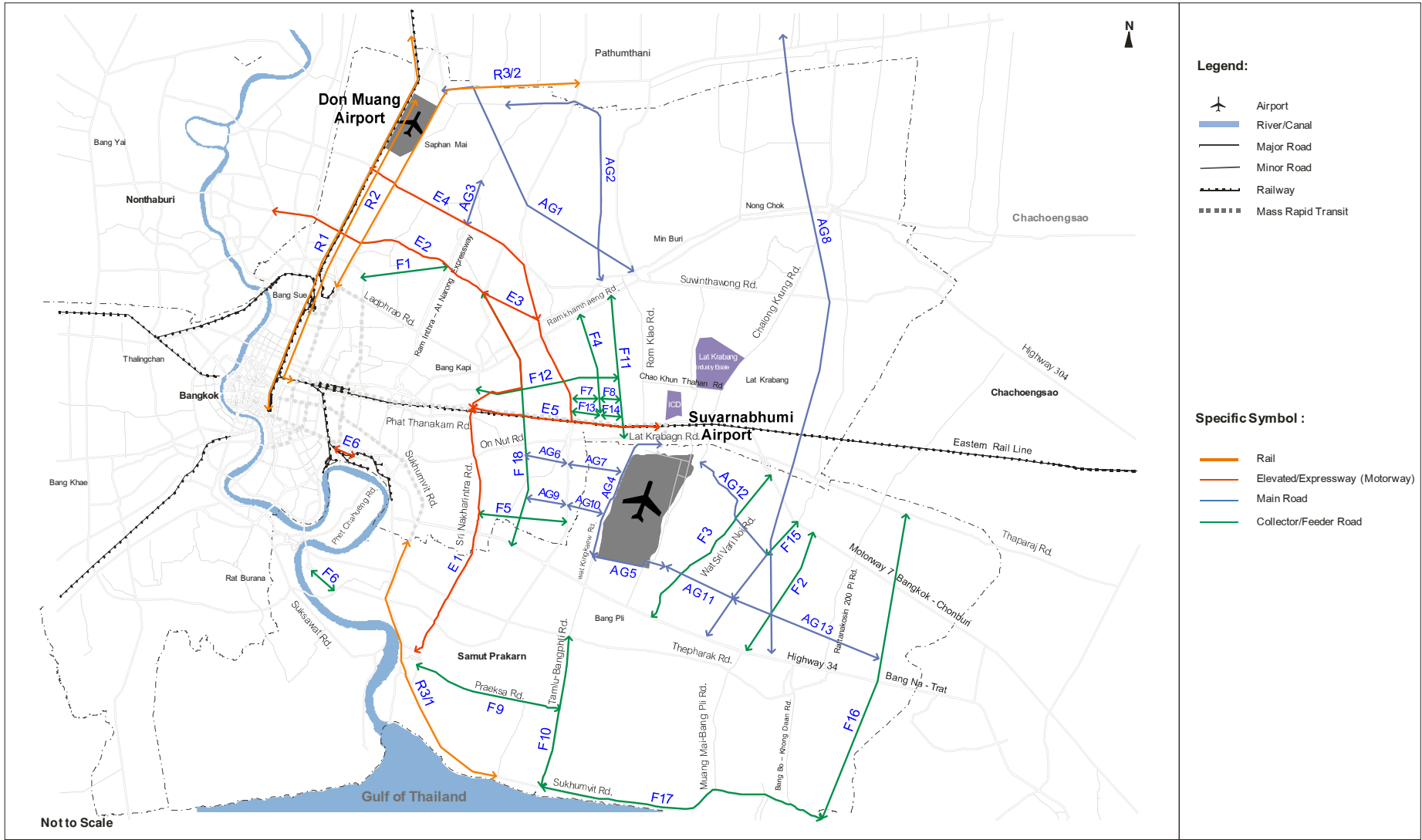
Network Group	Project Code	Project	Responsible Organization	Investment Pattern	Investment (Million Baht)	Year of investment	Remark
Rail	R1	MRT Red Line (Rangsit - Hua Lamphong)	SRT	PPPs	63,257	2010-2014	Not to open immediately after the end of the Plan
	R2	Extension of the Express MRT linking Suvarnabhumi and Don Muang Airports (Phayathai - Bang Sue - Don Muang Airport)	SRT	PPPs	32,864	2010-2014	Not to open immediately after the end of the Plan
	R3	MRT Green Line Section 1 (R3/1) and Section 2 (R3/2)	BMA / BTS	PPPs	100,031	2009-2011 (R3/1)	To open for service after the end of the Plan only on section 1 (R3/1)
Elevated/Expressway (Motorway)	E1*	Sri Nakharintra - Bang Na - Samut Prakarn Expressway	EXAT	PPPs	10,076	2010-2014	Not to open immediately after the end of the Plan
	E2*	Northern Section of the Third Stage Expressway (Khae Rai - Kaset Navamintra - Motorway)	EXAT	PPPs	26,397	2010-2014	Not to open immediately after the end of the Plan
	E3	Elevated Highway linking Don Muang - Suvarnabhumi Airport (Navamintra Road - Outer Ring Road)	DOH	PPPs	5,871	2010-2014	Not to open immediately after the end of the Plan
	E4	Elevated Highway linking Don Muang - Suvarnabhumi Airport (Ram Intra Road - Outer Ring Road)	DOH	PPPs	6,951	2010-2014	Not to open immediately after the end of the Plan
	E5*	Extension of Suvarnabhumi Motorway Section 1 (M1-1)	EXAT	PPPs	9,065	2010-2012	-
	E6*	Extension of Suvarnabhumi Motorway Section 2 (M1-2)	EXAT	PPPs	1,208	2011-2013	-
At Grade-Main Road	AG1	Highway linking Don Muang - Minburi	DOH	Government	6,756	2010-2012	-
	(AG2)	Improvement of Collector/Feeder Road linking Don Muang - Sai Mai - Hathairath - Rom Klao	DOH	Government	2,954	2010-2012	-
	(AG3)	Improvement of Collector/Feeder Road linking Don Muang - Sai Mai - Sukhabhival 5 - Ram Intra - Rom Klao	DOH	Government	297	2010-2012	-
	AG4*	Main Road parallel to Wat Kingkaew Road	DRR	Government	4,285	2010-2012	-
	AG5*	Main Road linking to Kingkaew Road	DRR	Government	2,276	2010-2012	-
	AG6*	New Main Road (Rom Klao - Eastern Ring Road Section 1, North Side)	BMA	Government	481	2011-2013	-
	AG7*	New Main Road (Bang Pli - Suvarnabhumi Section 2, North Side)	DRR	Government	692	2011-2013	-
	(AG8)*	The 3 rd Outer Ring Road	DOH	Government	9,440	2010-2014	Not to open immediately after the end of the Plan
	AG9*	New Main Road (Rom Klao - Eastern Ring Road Section 1, South Side)	BMA	Government	445	2012-2013	-
	AG10*	New Main Road (Bang Pli - Suvarnabhumi Section 2, South Side)	DRR	Government	490	2012-2013	-
	AG11*	Truck route (Aerolane) into the Airport (South Side)	DRR	Government	2,171	2011-2013	-
	(AG12)*	Truck route (Aerolane) into the Airport (North Side)	DRR	Government	2,223	2011-2013	-
	(AG13)*	Main Road (Bang Bo - Bang Saothong)	DRR	Government	2,366	2011-2013	-

Table 4.3-2 Details of Projects, Responsible Organizations, and Investment Pattern under Transport Development Action Plan for Suvarnabhumi Aerotropolis (Cont'd)

Network Group	Project Code	Project	Responsible Organization	Investment Pattern	Investment (Million Baht)	Year of investment	Remark
At Grade-Collector/Feeder Road	F1	Highway linking Ratchadabhisek - Kaset Navamintra	DOH	Government	8,028	2011-2013	-
	F2*	Road linking to Highway No.34	DRR	Government	1,837	2011-2013	-
	F3*	Road (Highway No.7 - Highway No.34)	DRR	Government	1,980	2010-2013	-
	F4*	Road linking Ram Kham Haeng Road	BMA	Government	1,675	2010-2012	-
	F5*	Road linking Udomsuk - Eastern Outer Ring Road	BMA	Government	1,010	2010-2011	-
	F6	Highway linking Industrial Ring Road and Kanchanabhisek Ring Road South	DOH	Government	680	2010-2011	-
	F7*	Collector/Feeder Road (Outer Ring Road - Rom Klao Section 1, North Side)	BMA	Government	130	2010-2011	-
	F8*	Collector/Feeder Road (Kheha Rom Klao - Rom Klao Section 2, North Side)	BMA	Government	130	2010-2011	-
	F9	Expansion of Praeksa Road	DOH	Government	2,122	2010-2013	-
	F10	Improvement of Highway No.3256 from 2 lanes to 8 lanes	DOH	Government	7,560	2010-2013	-
	F11*	Road linking Ramkhamhaeng - Sukhumvit 77	BMA	Government	4,620	2011-2013	-
	F12*	Road linking Sri Nakharintra Road	BMA	Government	2,963	2011-2013	-
	F13*	Collector/Feeder Road (Outer Ring Road - Rom Klao Section 1, South Side)	BMA	Government	130	2012-2013	-
	F14*	Collector/Feeder Road (Kheha Rom Klao - Rom Klao Section 2, South Side)	BMA	Government	130	2012-2013	-
	(F15)*	Road linking Highway No.7 - Highway No.34	DRR	Government	483	2012-2013	-
	F16	Road linking Highway No.3 - Theparaj Road	DRR	Government	4,731	2011-2013	-
	F17	Expansion of Sukhumvit Road (Bang Pli - Khlong Daan)	DOH	Government	4,256	2011-2013	-
	F18*	Road linking Navamintra Road - Highway No.34	BMA	Government	14,740	2010-2013	-

Source: The Consultant

- Note : (1) () Project suggested by the Consultant
 (2) * Project suggested for both cases of Dual Airport and Single Airport, the another Projects suggested only for Dual Airport case
 (3) ** Public-Private Partnerships: PPPs



Source: The Consultant

Note: Project R3 can be opened for service at the end of the Action Plan only Section 1 (R3/1)

Figure 4.3-1 Transport Network under Transport Development Action Plan for Suvarnabhumi Aerotropolis (Dual Airport)

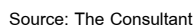


Figure 4.3-2 Transport Network under Transport Development Action Plan for Suvarnabhumi Aerotropolis (Single Airport)

The budget requirements for yearly investment from the government for 31 main road and collector/feeder road projects of each responsible organization under the Action Plan is shown in Table 4.3-3. Bangkok Metropolitan Administration, Department of Highways, and Department of Rural Roads require the budget for the development of road network at most during 2010 - 2013. The amount of budget is relatively high compared to the budget each organization has normally been allocated, especially Bangkok Metropolitan Administration and Department of Rural Roads. Since the government budget is their main source of fund available at present, these organizations should urgently consider other sources, such as soft loans or bonds, in order to operate efficiently according to the plan.

Table 4.3-3 Required Annual Budget for the Development of Main Road and Collector/Feeder Road Networks

Unit: Million Baht

Project	Annual Budget under the Action Plan				
	2009	2010	2011	2012	2013
Main Road Network	-	6,029	10,971	12,371	4,566
Bangkok Metropolitan Administration	-	-	120	465	346
Department of Highways	-	4,389	6,363	6,335	1,416
Department of Rural Roads	-	1,640	4,488	5,571	2,804
Collector/Feeder Road Network	-	4,229	17,300	20,846	14,830
Bangkok Metropolitan Administration	-	2,655	8,233	8,934	5,706
Department of Highways	-	1,376	6,732	8,302	6,236
Department of Rural Roads	-	198	2,335	3,610	2,888
Total	-	10,258	28,271	33,217	19,396

Source: The Consultant

4.4 Transport Network Development Priority

In the Master Plan, the appropriate transport network is recommended to support the development of Suvarnabhumi Aerotropolis consisting of 45 projects in case of Dual Airport Policy, and 30 projects in case of Single Airport Policy. Such projects have been prioritized with special attention to those of the elevated /expressway (motorway) and of rail network respectively. 40 projects for Dual Airport Policy and 26 projects for Single Airport Policy from the Action Plan were also considered and prioritized in the same manner to complement the Master Plan. The development of main roads and collector/feeder roads followed a similar prioritization.

The criteria for consideration are those that are complementary with the transport sector development stated in the Tenth National Economic and Social Development Plan (B.E.2550-2554), and the National Administration Plan (B.E.2551-2554), and can be summarized as; (1) giving first priority to the elevated/expressway (motorway) and rail, though these projects require huge investment and may not be financially viable. But once the projects are opened for servicing, they will create economic and social benefit to the society in general. The elevated highway can support high volume of traffic while the mass rapid transit

can transport a large number of passengers. These two types of project will enable efficient and convenient traveling, help in solving traffic congestion on the roads, and save energy usage, (2) giving priority to the routes linking Don Muang Airport and Suvarnabhumi Airport in order to provide convenience for traveling between the two airports, (3) giving priority to the routes that found in this study to have high volume of traffic in the future, and (4) giving priority to the projects that will be part of the complete network and system, as well as can easily link Suvarnabhumi Airport to the communities, tourist attractions, and industrial areas. In consideration of 4 criteria above, priority for transport projects supporting Suvarnabhumi Aerotropolis under the Master Plan are shown in Tables 4.4-1 and 4.4-2, and the projects under the Action Plan are shown in Tables 4.4-3 and 4.4-4.

Table 4.4-1 Overall Network Development under Transport Development Master Plan for Suvarnabhumi Aerotropolis (Dual Airport)

Priority	Project Code	Project	Network Type	Responsible Organization	Distance (kms.)	Construction Period (Years)	Investment Period	Investment Budget in the Master Plan											Investment (Million Baht)	Investment Pattern	Environmental Effect *
								2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019			
1	E1	Sri Nakharintra - Bang Na - Samut Prakarn Expressway	Elevated/Expressway (Motorway)	EXAT	14.0	5	2010-2014	-	2,015	2,519	3,023	1,511	1,008	-	-	-	-	-	10,076	PPPs**	High-Medium
2	E2	Northern Section of the Third Stage Expressway (Khae Rai - Kaset Navamintra - Motorway)	Elevated/Expressway (Motorway)	EXAT	28.0	5	2010-2014	-	5,279	6,599	7,919	3,960	2,640	-	-	-	-	-	26,397	PPPs	High-Medium
3	E3	Elevated Highway linking Don Muang - Suvarnabhumi Airport (Navamintra Road - Outer Ring Road)	Elevated/Expressway (Motorway)	DOH	16.0	5	2010-2014	-	1,174	1,468	1,761	881	587	-	-	-	-	-	5,871	PPPs	High-Medium
4	E4	Elevated Highway linking Don Muang - Suvarnabhumi Airport (Ram Intra Road - Outer Ring Road)	Elevated/Expressway (Motorway)	DOH	9.5	5	2010-2014	-	1,390	1,738	2,085	1,043	695	-	-	-	-	-	6,951	PPPs	High-Medium
5	E5	Extension of Suvarnabhumi Motorway Section 1 (M1-1)	Elevated/Expressway (Motorway)	EXAT	12.5	3	2010-2012	-	2,266	3,626	3,173	-	-	-	-	-	-	-	9,065	PPPs	High-Medium
6	E6	Extension of Suvarnabhumi Motorway Section 2 (M1-2)	Elevated/Expressway (Motorway)	EXAT	1.5	3	2011-2013	-	-	302	483	423	-	-	-	-	-	-	1,208	PPPs	High-Medium
7	R3	MRT Green Line Section 1 (R3/1) and Section 2 (R3/2)	Rail	BMA/BTSC	41.5	6	2009-2011 (R3/1) 2016-2018 (R3/2)	13,998	22,396	19,597	-	-	-	-	11,010	17,616	15,414	-	100,031	PPPs	High-Medium (R3/1) Medium-Low (R3/2)
8	R1	MRT Red Line (Rangsit - Hua Lamphong)	Rail	SRT	30.0	5	2010-2014	-	12,651	15,814	18,977	9,489	6,326	-	-	-	-	-	63,257	PPPs	High-Medium
9	R2	Extension of the Express MRT linking Suvarnabhumi and Don Muang Airports (Phayathai - Bang Sue - Don Muang Airport)	Rail	SRT	20.0	5	2010-2014	-	6,573	8,216	9,859	4,930	3,286	-	-	-	-	-	32,864	PPPs	High-Medium
10	AG1	Highway linking Don Muang - Minburi	Main Road	DOH	18.5	3	2010-2012	-	1,689	2,702	2,365	-	-	-	-	-	-	-	6,756	Gov. Investment	High-Medium
11	(AG3)	Improvement of Collector/Feeder Road linking Don Muang - Sai Mai - Sukhabhibal 5 - Ram Intra - Rom Klao	Main Road	DOH	2.0	3	2010-2012	-	74	119	104	-	-	-	-	-	-	-	297	Gov. Investment	High-Medium
12	AG5	Main Road linking to Kingkaew Road	Main Road	DRR	4.5	3	2010-2012	-	569	910	797	-	-	-	-	-	-	-	2,276	Gov. Investment	Low-None
13	AG4	Main Road parallel to Wat Kingkaew Road	Main Road	DRR	9.0	3	2010-2012	-	1,071	1,714	1,500	-	-	-	-	-	-	-	4,285	Gov. Investment	Medium-Low
14	(AG2)	Improvement of Collector/Feeder Road linking Don Muang - Sai Mai - Hathairath - Rom Klao	Main Road	DOH	15.0	3	2010-2012	-	738	1,182	1,034	-	-	-	-	-	-	-	2,954	Gov. Investment	High-Medium
15	AG11	Truck route (Aerolane) into the Airport (South Side)	Main Road	DRR	10.0	3	2011-2013	-	-	543	868	760	-	-	-	-	-	-	2,171	Gov. Investment	Low-None
16	(AG12)	Truck route (Aerolane) into the Airport (North Side)	Main Road	DRR	11.5	3	2011-2013	-	-	556	889	778	-	-	-	-	-	-	2,223	Gov. Investment	Low-None
17	(AG13)	Main Road (Bang Bo - Bang Saothong)	Main Road	DRR	10.5	3	2011-2013	-	-	592	946	828	-	-	-	-	-	-	2,366	Gov. Investment	Medium-Low
18	AG10	New Main Road (Bang Pli - Suvarnabhumi Section 2, South Side)	Main Road	DRR	1.8	2	2012-2013	-	-	-	294	196	-	-	-	-	-	-	490	Gov. Investment	Low-None
19	AG9	New Main Road (Rom Klao - Eastern Ring Road Section 1, South Side)	Main Road	BMA	3.0	2	2012-2013	-	-	-	267	178	-	-	-	-	-	-	445	Gov. Investment	Low-None
20	AG6	New Main Road (Rom Klao - Eastern Ring Road Section 1, North Side)	Main Road	BMA	3.0	3	2011-2013	-	-	120	193	168	-	-	-	-	-	-	481	Gov. Investment	Low-None
21	AG7	New Main Road (Bang Pli - Suvarnabhumi Section 2, North Side)	Main Road	DRR	2.5	3	2011-2013	-	-	173	277	242	-	-	-	-	-	-	692	Gov. Investment	Medium-Low
22	(AG8)	The 3 rd Outer Ring Road	Main Road	DOH	39.0	5	2010-2014	-	1,888	2,360	2,832	1,416	944	-	-	-	-	-	9,440	Gov. Investment	Low-None
23	F6	Highway linking Industrial Ring Road and Kanchanabhisek Ring Road South	Collector/Feeder Road	DOH	1.5	2	2010-2011	-	408	272	-	-	-	-	-	-	-	-	680	Gov. Investment	Low-None
24	F7	Collector/Feeder Road (Outer Ring Road - Rom Klao Section 1, North Side)	Collector/Feeder Road	BMA	1.5	2	2010-2011	-	78	52	-	-	-	-	-	-	-	-	130	Gov. Investment	Medium-Low
25	F5	Road linking Udomsuk - Eastern Outer Ring Road	Collector/Feeder Road	BMA	3.5	2	2010-2011	-	606	404	-	-	-	-	-	-	-	-	1,010	Gov. Investment	Medium-Low
26	F8	Collector/Feeder Road (Kheha Rom Klao - Rom Klao Section 2, North Side)	Collector/Feeder Road	BMA	1.5	2	2010-2011	-	78	52	-	-	-	-	-	-	-	-	130	Gov. Investment	Low-None
27	F4	Road linking Ram Kham Haeng Road	Collector/Feeder Road	BMA	6.5	3	2010-2012	-	419	670	586	-	-	-	-	-	-	-	1,675	Gov. Investment	Medium-Low
28	F1	Highway linking Ratchadabhisek - Kaset Navamintra	Collector/Feeder Road	BMA	6.0	3	2011-2013	-	-	2,007	3,211	2,810	-	-	-	-	-	-	8,028	Gov. Investment	Medium-Low
29	F17	Expansion of Sukhumvit Road (Bang Pli - Khlong Daan)	Collector/Feeder Road	BMA	23.0	3	2011-2013	-	-	1,064	1,702	1,490	-	-	-	-	-	-	4,256	Gov. Investment	Low-None
30	F12	Road linking Sri Nakharintra Road	Collector/Feeder Road	BMA	9.0	3	2011-2013	-	-	741	1,185	1,037	-	-	-	-	-	-	2,963	Gov. Investment	High-Medium
31	F11	Road linking Ramkhamhaeng - Sukhumvit 77	Collector/Feeder Road	BMA	10.0	3	2011-2013	-	-	1,155	1,848	1,617	-	-	-	-	-	-	4,620	Gov. Investment	Medium-Low
32	F9	Expansion of Praeksa Road	Collector/Feeder Road	DOH	9.5	4	2010-2013	-	212	743	743	424	-	-	-	-	-	-	2,122	Gov. Investment	Medium-Low
33	F10	Improvement of Highway No.3256 from 2 lanes to 8 lanes	Collector/Feeder Road	DOH	10.0	4	2010-2013	-	756	2,646	2,646	1,512	-	-	-	-	-	-	7,560	Gov. Investment	Medium-Low
34	F18	Road linking Navamintra Road - Highway No.34	Collector/Feeder Road	BMA	17.5	4	2010-2013	-	1,474	5,159	5,159	2,948	-	-	-	-	-	-	14,740	Gov. Investment	Low-None
35	F2	Road linking to Highway No.34	Collector/Feeder Road	DRR	9.5	3	2011-2013	-	-	459	735	643	-	-	-	-	-	-	1,837	Gov. Investment	Low-None
36	F16	Road linking Highway No.3 - Theparaj Road	Collector/Feeder Road	DRR	20.5	3	2011-2013	-	-	1,183	1,892	1,656	-	-	-	-	-	-	4,731	Gov. Investment	Medium-Low
37	F3	Road (Highway No.7 - Highway No.34)	Collector/Feeder Road	DRR	13.0	4	2010-2013	-	198	693	693	396	-	-	-	-	-	-	1,980	Gov. Investment	Medium-Low
38	F13	Collector/Feeder Road (Outer Ring Road - Rom Klao Section 1, South Side)	Collector/Feeder Road	BMA	1.5	2	2012-2013	-	-	-	78	52	-	-	-	-	-	-	130	Gov. Investment	Low-None
39	F14	Collector/Feeder Road (Kheha Rom Klao - Rom Klao Section 2, South Side)	Collector/Feeder Road	BMA	1.5	2	2012-2013	-	-	-	78	52	-	-	-	-	-	-	130	Gov. Investment	Low-None
40	(F15)	Road linking Highway No.7 - Highway No.34	Collector/Feeder Road	DRR	2.5	2	2012-2013	-	-	-	290	193	-	-	-	-	-	-	483	Gov. Investment	Medium-Low
41	F19	Road along Highway No.7	Collector/Feeder Road	DRR	16.5	4	2016-2019	-	-	-	-	-	-	-	233	815	815	466	2,329	Gov. Investment	Low-None
42	(F20)	Road along Eastern Ring Road Left Side (Sukhabhibal - Highway No.7)	Collector/Feeder Road	DRR	6.0	4	2016-2019	-	-	-	-	-	-	-	76	267	267	153	763	Gov. Investment	Medium-None
43	(F21)	Road along Eastern Ring Road Right Side (Highway No.7 - Theparak)	Collector/Feeder Road	DRR	15.0	4	2016-2019	-	-	-	-	-	-	-	226	793	793	453	2,265	Gov. Investment	Medium-None
44	F22	Collector/Feeder Road (Sukhumvit - Theparak)	Collector/Feeder Road	DRR	11.0	4	2016-2019	-	-	-	-	-	-	-	436	1,524	1,524	871	4,355	Gov. Investment	Low-None
45	(F23)	New Road (Highway No.34 - Theparak Road)	Collector/Feeder Road	DRR	2.0	4	2016-2019	-	-	-	-	-	-	-	55	193	193	110	551	Gov. Investment	Low-None

Source: The Consultant

Note: (1) () Project suggested by the Consultant

(2) * Primary comparative analysis and assessment according to expected environmental effects in each project by weighted scoring

(3) ** Public-Private Partnerships: PPPs

Table 4.4-2 Overall Network Development under Transport Development Master Plan for Suvarnabhumhi Aerotropolis (Single Airport)

Priority	Project Code	Project	Network Type	Responsible Organization	Distance (kms.)	Construction Period (Years)	Investment Period	Investment Budget in the Master Plan											Investment (Million Baht)	Investment Pattern	Environmental Effect *
								2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019			
1	E1	Sri Nakharintra - Bang Na - Samut Prakarn Expressway	Elevated/Expressway (Motorway)	EXAT	14.0	5	2010-2014	-	2,015	2,519	3,023	1,511	1,008	-	-	-	-	-	10,076	PPPs**	High-Medium
2	E2	Northern Section of the Third Stage Expressway (Khae Rai - Kaset Navamintra - Motorway)	Elevated/Expressway (Motorway)	EXAT	28.0	5	2010-2014	-	5,279	6,599	7,919	3,960	2,640	-	-	-	-	-	26,397	PPPs	High-Medium
3	E5	Extension of Suvarnabhumhi Motorway Section 1 (M1-1)	Elevated/Expressway (Motorway)	EXAT	12.5	3	2010-2012	-	2,266	3,626	3,173	-	-	-	-	-	-	-	9,065	PPPs	High-Medium
4	E6	Extension of Suvarnabhumhi Motorway Section 2 (M1-2)	Elevated/Expressway (Motorway)	EXAT	1.5	3	2011-2013	-	-	302	483	423	-	-	-	-	-	-	1,208	PPPs	High-Medium
5	AG5	Main Road linking to Kingkaew Road	Main Road	DRR	4.5	3	2010-2012	-	569	910	797	-	-	-	-	-	-	-	2,276	Gov. Investment	Low-None
6	AG4	Main Road parallel to Wat Kingkaew Road	Main Road	DRR	9.0	3	2010-2012	-	1,071	1,714	1,500	-	-	-	-	-	-	-	4,285	Gov. Investment	Medium-Low
7	AG11	Truck route (Aerolane) into the Airport (South Side)	Main Road	DRR	10.0	3	2011-2013	-	-	543	868	760	-	-	-	-	-	-	2,171	Gov. Investment	Low-None
8	(AG12)	Truck route (Aerolane) into the Airport (North Side)	Main Road	DRR	11.5	3	2011-2013	-	-	556	889	778	-	-	-	-	-	-	2,223	Gov. Investment	Low-None
9	(AG13)	Main Road (Bang Bo - Bang Saothong)	Main Road	DRR	10.5	3	2011-2013	-	-	592	946	828	-	-	-	-	-	-	2,366	Gov. Investment	Medium-Low
10	AG10	New Main Road (Bang Pli - Suvarnabhumhi Section 2, South Side)	Main Road	DRR	1.8	2	2012-2013	-	-	-	294	196	-	-	-	-	-	-	490	Gov. Investment	Low-None
11	AG9	New Main Road (Rom Klao - Eastern Ring Road Section 1, South Side)	Main Road	BMA	3.0	2	2012-2013	-	-	-	267	178	-	-	-	-	-	-	445	Gov. Investment	Low-None
12	AG6	New Main Road (Rom Klao - Eastern Ring Road Section 1, North Side)	Main Road	BMA	3.0	3	2011-2013	-	-	120	193	168	-	-	-	-	-	-	481	Gov. Investment	Low-None
13	AG7	New Main Road (Bang Pli - Suvarnabhumhi Section 2, North Side)	Main Road	DRR	2.5	3	2011-2013	-	-	173	277	242	-	-	-	-	-	-	692	Gov. Investment	Medium-Low
14	(AG8)	The 3 rd Outer Ring Road	Main Road	DOH	39.0	5	2010-2014	-	1,888	2,360	2,832	1,416	944	-	-	-	-	-	9,440	Gov. Investment	Low-None
15	F7	Collector/Feeder Road (Outer Ring Road - Rom Klao Section 1, North Side)	Collector/Feeder Road	BMA	1.5	2	2010-2011	-	78	52	-	-	-	-	-	-	-	-	130	Gov. Investment	Medium-Low
16	F5	Road linking Udomsuk - Eastern Outer Ring Road	Collector/Feeder Road	BMA	3.5	2	2010-2011	-	606	404	-	-	-	-	-	-	-	-	1,010	Gov. Investment	Medium-Low
17	F8	Collector/Feeder Road (Kheha Rom Klao - Rom Klao Section 2, North Side)	Collector/Feeder Road	BMA	1.5	2	2010-2011	-	78	52	-	-	-	-	-	-	-	-	130	Gov. Investment	Low-None
18	F4	Road linking Ram Kham Haeng Road	Collector/Feeder Road	BMA	6.5	3	2010-2012	-	419	670	586	-	-	-	-	-	-	-	1,675	Gov. Investment	Medium-Low
19	F12	Road linking Sri Nakharintra Road	Collector/Feeder Road	BMA	9.0	3	2011-2013	-	-	741	1,185	1,037	-	-	-	-	-	-	2,963	Gov. Investment	High-Medium
20	F11	Road linking Ramkhamhaeng - Sukhumvit 77	Collector/Feeder Road	BMA	10.0	3	2011-2013	-	-	1,155	1,848	1,617	-	-	-	-	-	-	4,620	Gov. Investment	Medium-Low
21	F18	Road linking Navamintra Road - Highway No.34	Collector/Feeder Road	BMA	17.5	4	2010-2013	-	1,474	5,159	5,159	2,948	-	-	-	-	-	-	14,740	Gov. Investment	Low-None
22	F2	Road linking to Highway No.34	Collector/Feeder Road	DRR	9.5	3	2011-2013	-	-	459	735	643	-	-	-	-	-	-	1,837	Gov. Investment	Low-None
23	F3	Road (Highway No.7 - Highway No.34)	Collector/Feeder Road	DRR	13.0	4	2010-2013	-	198	693	693	396	-	-	-	-	-	-	1,980	Gov. Investment	Medium-Low
24	F13	Collector/Feeder Road (Outer Ring Road - Rom Klao Section 1, South Side)	Collector/Feeder Road	BMA	1.5	2	2012-2013	-	-	-	78	52	-	-	-	-	-	-	130	Gov. Investment	Low-None
25	F14	Collector/Feeder Road (Kheha Rom Klao - Rom Klao Section 2, South Side)	Collector/Feeder Road	BMA	1.5	2	2012-2013	-	-	-	78	52	-	-	-	-	-	-	130	Gov. Investment	Low-None
26	(F15)	Road linking Highway No.7 - Highway No.34	Collector/Feeder Road	DRR	2.5	2	2012-2013	-	-	-	290	193	-	-	-	-	-	-	483	Gov. Investment	Medium-Low
27	F19	Road along Highway No.7	Collector/Feeder Road	DRR	16.5	4	2016-2019	-	-	-	-	-	-	-	233	815	815	466	2,329	Gov. Investment	Low-None
28	(F20)	Road along Eastern Ring Road Left Side (Sukhabhibal - Highway No.7)	Collector/Feeder Road	DRR	6.0	4	2016-2019	-	-	-	-	-	-	-	76	267	267	153	763	Gov. Investment	Medium-None
29	(F21)	Road along Eastern Ring Road Right Side (Highway No.7 - Theparak)	Collector/Feeder Road	DRR	15.0	4	2016-2019	-	-	-	-	-	-	-	226	793	793	453	2,265	Gov. Investment	Medium-None
30	(F23)	New Road (Highway No.34 - Theparak Road)	Collector/Feeder Road	DRR	2.0	4	2016-2019	-	-	-	-	-	-	-	55	193	193	110	551	Gov. Investment	Low-None

Source: The Consultant

- Note:
- (1) () Project suggested by the Consultant
 - (2) * Primary comparative analysis and assessment according to expected environmental effects in each project by weighted scoring
 - (3) ** Public-Private Partnerships: PPPs

Table 4.4-3 Overall Network Development under Transport Development Action Plan for Suvarnabhumi Aerotropolis (Dual Airport)

No.	Project Code	Project	Distance (kms.)	Construction Period (Years)	Investment Period	Investment Budget in the Master Plan (in the Action Plan 2009-2013)											Investment (Million Baht)	Investment Pattern	Study Status/Environmental Assessment	Priority in Master Plan **
						2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019				
State Railway of Thailand																				
1	R1*	MRT Red Line (Rangsit - Hua Lamphong)	30.0	5	2010-2014	-	12,651	15,814	18,977	9,489	6,326	-	-	-	-	-	63,257	PPPs****	Environmental Assessment Report was submitted and approved from Office of Natural Resource and Environment Policy and Planning	8
2	R2*	Extension of the Express MRT linking Suvarnabhumi and Don Muang Airports (Phayathai - Bang Sue - Don Muang Airport)	20.0	5	2010-2014	-	6,573	8,216	9,859	4,930	3,286	-	-	-	-	-	32,864	PPPs	Environmental Assessment Report on Rail Transport Linking to Suvarnabhumi Airport was submitted since March, B.E. 2547 and was approved by Office of Natural Resource and Environmental Policy and Planning.	9
Expressway Authority of Thailand																				
1	E1*	Sri Nakharintra - Bang Na - Samut Prakam Expressway	14.0	5	2010-2014	-	2,015	2,519	3,023	1,511	1,008	-	-	-	-	-	10,076	PPPs	Environmental Assessment Report was submitted and approved from Office of Natural Resource and Environment Policy and Planning	1
2	E2*	Northern Section of the Third Stage Expressway (Khae Rai - Kaset Navamintra - Motorway)	28.0	5	2010-2014	-	5,279	6,599	7,919	3,960	2,640	-	-	-	-	-	26,397	PPPs	Environmental Assessment Report was submitted and approved from Office of Natural Resource and Environment Policy and Planning	2
3	E5	Extension of Suvarnabhumi Motorway Section 1 (M1-1)	12.5	3	2010-2012	-	2,266	3,626	3,173	-	-	-	-	-	-	-	9,065	PPPs	Environmental Assessment Report is not yet submitted to Office of natural Resource and Environment Policy and Planning	5
4	E6	Extension of Suvarnabhumi Motorway Section 2 (M1-2)	1.5	3	2011-2013	-	-	302	483	423	-	-	-	-	-	-	1,208	PPPs	Environmental Assessment Report is not yet submitted to Office of natural Resource and Environment Policy and Planning	6
Bangkok Metropolitan Administration																				
1	R3***	MRT Green Line Section 1 (R3/1) and Section 2 (R3/2)	41.5	6	2009-2011 (R3/1) 2016-2018 (R3/2)	13,998	22,396	19,597	-	-	-	-	11,010	17,616	15,414	-	100,031	PPPs	Environmental Assessment Report was submitted, and waiting for approval from Office of Natural Resource and Environment Policy and Planning	7
2	AG9	New Main Road (Rom Klao - Eastern Ring Road Section 1, South Side)	3.0	2	2012-2013	-	-	-	267	178	-	-	-	-	-	-	445	Gov. Investment	Environmental Assessment Report is not required	19
3	AG6	New Main Road (Rom Klao - Eastern Ring Road Section 1, North Side)	3.0	3	2011-2013	-	-	120	193	168	-	-	-	-	-	-	481	Gov. Investment	Environmental Assessment Report is not required	20
4	F7	Collector/Feeder Road (Outer Ring Road - Rom Klao Section 1, North Side)	1.5	2	2010-2011	-	78	52	-	-	-	-	-	-	-	-	130	Gov. Investment	Environmental Assessment Report is not required	24
5	F5	Road linking Udomsuk - Eastern Outer Ring Road	3.5	2	2010-2011	-	606	404	-	-	-	-	-	-	-	-	1,010	Gov. Investment	Environmental Assessment Report is not required	25
6	F8	Collector/Feeder Road (Kheha Rom Klao - Rom Klao Section 2, North Side)	1.5	2	2010-2011	-	78	52	-	-	-	-	-	-	-	-	130	Gov. Investment	Environmental Assessment Report is not required	26
7	F4	Road linking Ram Kham Haeng Road	6.5	3	2010-2012	-	419	670	586	-	-	-	-	-	-	-	1,675	Gov. Investment	Environmental Assessment Report is not required	27
8	F12	Road linking Sri Nakharintra Road	9.0	3	2011-2013	-	-	741	1,185	1,037	-	-	-	-	-	-	2,963	Gov. Investment	Environmental Assessment Report is not required	30
9	F11	Road linking Ramkhamhaeng - Sukhumvit 77	10.0	3	2011-2013	-	-	1,155	1,848	1,617	-	-	-	-	-	-	4,620	Gov. Investment	Environmental Assessment Report is not required	31
10	F18	Road linking Navamintra Road - Highway No.34	17.5	4	2010-2013	-	1,474	5,159	5,159	2,948	-	-	-	-	-	-	14,740	Gov. Investment	Environmental Assessment Report is not required	34
11	F13	Collector/Feeder Road (Outer Ring Road - Rom Klao Section 1, South Side)	1.5	2	2012-2013	-	-	-	78	52	-	-	-	-	-	-	130	Gov. Investment	Environmental Assessment Report is not required	38
12	F14	Collector/Feeder Road (Kheha Rom Klao - Rom Klao Section 2, South Side)	1.5	2	2012-2013	-	-	-	78	52	-	-	-	-	-	-	130	Gov. Investment	Environmental Assessment Report is not required	39
Department of Highways																				
1	E3*	Elevated Highway linking Don Muang - Suvarnabhumi Airport (Navamintra Road - Outer Ring Road)	16.0	5	2010-2014	-	1,174	1,468	1,761	881	587	-	-	-	-	-	5,871	PPPs	Environmental Assessment Report was submitted to Office of Natural Resource and Environment Policy and Planning but was withdrawn later	3
2	E4*	Elevated Highway linking Don Muang - Suvarnabhumi Airport (Ram Intra Road - Outer Ring Road)	9.5	5	2010-2014	-	1,390	1,738	2,085	1,043	695	-	-	-	-	-	6,951	PPPs	Environmental Assessment Report was submitted to Office of Natural Resource and Environment Policy and Planning but was withdrawn later	4
3	AG1	Highway linking Don Muang - Minburi	18.5	3	2010-2012	-	1,689	2,702	2,365	-	-	-	-	-	-	-	6,756	Gov. Investment	Environmental Assessment Report is not required	10
4	(AG3)	Improvement of Collector/Feeder road linking Don Muang - Sai Mai - Sukhabhibal 5 - Ram Intra - Rom Klao	2.0	3	2010-2012	-	74	119	104	-	-	-	-	-	-	-	297	Gov. Investment	Environmental Assessment Report is not required	11
5	(AG2)	Improvement of Collector/Feeder road linking Don Muang - Sai Mai - Hathairath - Rom Klao	15.0	3	2010-2012	-	738	1,182	1,034	-	-	-	-	-	-	-	2,954	Gov. Investment	Environmental Assessment Report is not required	14
6	(AG8)*	The 3 rd Outer Ring Road	39.0	5	2010-2014	-	1,888	2,360	2,832	1,416	944	-	-	-	-	-	9,440	Gov. Investment	Environmental Impact Assessment within the Study Report for the 3 rd Outer Ring Road was done by the DOH, 2008	22
7	F6	Highway linking Industrial Ring Road and Kanchanabhisek Ring Road South	1.5	2	2010-2011	-	408	272	-	-	-	-	-	-	-	-	680	Gov. Investment	Environmental Assessment Report is not required	23
8	F1	Highway linking Ratchadabhisek - Kaset Navamintra	6.0	3	2011-2013	-	-	2,007	3,211	2,810	-	-	-	-	-	-	8,028	Gov. Investment	Environmental Assessment Report is not required	28
9	F17	Expansion of Sukhumvit Road (Bang Pli - Khlong Daan)	23.0	3	2011-2013	-	-	1,064	1,702	1,490	-	-	-	-	-	-	4,256	Gov. Investment	Environmental Assessment Report is not required	29
10	F9	Expansion of Praeksa Road	9.5	4	2010-2013	-	212	743	743	424	-	-	-	-	-	-	2,122	Gov. Investment	Environmental Assessment Report is not required	32
11	F10	Improvement of Highway No.3256 from 2 lanes to 8 lanes	10.0	4	2010-2013	-	756	2,646	2,646	1,512	-	-	-	-	-	-	7,560	Gov. Investment	Environmental Assessment Report is not required	33

Table 4.4-3 Overall Network Development under Transport Development Action Plan for Suvarnabhumi Aerotropolis (Dual Airport) (Cont'd)

No.	Project Code	Project	Distance (kms.)	Construction Period (Years)	Investment Period	Investment Budget in the Master Plan (in the Action Plan 2009-2013)											Investment (Million Baht)	Investment Pattern	Study Status/Environmental Assessment	Priority in Master Plan **
						2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019				
Department of Rural Roads																				
1	AG5	Main Road linking to Kingkaew Road	4.5	3	2010-2012	-	569	910	797	-	-	-	-	-	-	-	2,276	Gov. Investment	Environmental Assessment Report is not required	12
2	AG4	Main Road parallel to Wat Kingkaew Road	9.0	3	2010-2012	-	1,071	1,714	1,500	-	-	-	-	-	-	-	4,285	Gov. Investment	Environmental Assessment Report is not required	13
3	AG11	Truck route (Aerolane) into the Airport (South Side)	10.0	3	2011-2013	-	-	543	868	760	-	-	-	-	-	-	2,171	Gov. Investment	Environmental Assessment Report is not required	15
4	(AG12)	Truck route (Aerolane) into the Airport (North Side)	11.5	3	2011-2013	-	-	556	889	778	-	-	-	-	-	-	2,223	Gov. Investment	Environmental Assessment Report is not required	16
5	(AG13)	Main Road (Bang Bo - Bang Saothong)	10.5	3	2011-2013	-	-	592	946	828	-	-	-	-	-	-	2,366	Gov. Investment	Environmental Assessment Report is not required	17
6	AG10	New Main Road (Bang Pli - Suvarnabhumi Section 2, South Side)	1.8	2	2012-2013	-	-	-	294	196	-	-	-	-	-	-	490	Gov. Investment	Environmental Assessment Report is not required	18
7	AG7	New Main Road (Bang Pli - Suvarnabhumi Section 2, North Side)	2.5	3	2011-2013	-	-	173	277	242	-	-	-	-	-	-	692	Gov. Investment	Environmental Assessment Report is not required	21
8	F2	Road linking to Highway No.34	9.5	3	2011-2013	-	-	459	735	643	-	-	-	-	-	-	1,837	Gov. Investment	Environmental Assessment Report is not required	35
9	F16	Road linking Highway No.3 - Theparaj Road	20.5	3	2011-2013	-	-	1,183	1,892	1,656	-	-	-	-	-	-	4,731	Gov. Investment	Environmental Assessment Report is not required	36
10	F3	Road (Highway No.7 - Highway No.34)	13.0	4	2010-2013	-	198	693	693	396	-	-	-	-	-	-	1,980	Gov. Investment	Environmental Assessment Report is not required	37
11	(F15)	Road linking Highway No.7 - Highway No.34	2.5	2	2012-2013	-	-	-	290	193	-	-	-	-	-	-	483	Gov. Investment	Environmental Assessment Report is not required	40

Source: The Consultant

- Note:
- (1)

()

Project suggested by the Consultant
- (2)

*

Project that cannot be opened for service immediately at the end of the Action Plan
- (3)

**

Priority in accordance with the Master Plan (Dual Airport case) as shown in Table 4.4-1
- (4)

Project R3 can be opened for service at the end of the Action Plan only on Section 1 (R3/1)
- (5)

Public-Private Partnerships: PPPs

Table 4.4-4 Overall Network Development under Transport Development Action Plan for Suvarnabhumi Aerotropolis (Single Airport)

No.	Project Code	Project	Distance (kms.)	Construction Period (Years)	Investment Period	Investment Budget in the Master Plan (in the Action Plan 2009-2013)											Investment (Million Baht)	Investment Pattern	Study Status/Environmental Assessment	Priority in Master Plan **
						2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019				
Expressway Authority of Thailand																				
1	E1*	Sri Nakharintra - Bang Na - Samut Prakarn Expressway	14.0	5	2010-2014	-	2,015	2,519	3,023	1,511	1,008	-	-	-	-	-	10,076	PPPs****	Environmental Assessment Report was submitted and approved from Office of Natural Resource and Environment Policy and Planning	1
2	E2*	Northern Section of the Third Stage Expressway (Khae Rai - Kaset Navamintra - Motorway)	28.0	5	2010-2014	-	5,279	6,599	7,919	3,960	2,640	-	-	-	-	-	26,397	PPPs	Environmental Assessment Report was submitted and approved from Office of Natural Resource and Environment Policy and Planning	2
3	E5	Extension of Suvarnabhumi Motorway Section 1 (M1-1)	12.5	3	2010-2012	-	2,266	3,626	3,173	-	-	-	-	-	-	-	9,065	PPPs	Environmental Assessment Report was submitted and approved from Office of Natural Resource and Environment Policy and Planning	3
4	E6	Extension of Suvarnabhumi Motorway Section 2 (M1-2)	1.5	3	2011-2013	-	-	302	483	423	-	-	-	-	-	-	1,208	PPPs	Environmental Assessment Report was submitted and approved from Office of Natural Resource and Environment Policy and Planning	4
Bangkok Metropolitan Administration																				
1	AG9	New Main Road (Rom Klao - Eastern Ring Road Section 1, South Side)	3.0	2	2012-2013	-	-	-	267	178	-	-	-	-	-	-	445	Gov. Investment	Environmental Assessment Report is not required	11
2	AG6	New Main Road (Rom Klao - Eastern Ring Road Section 1, North Side)	3.0	3	2011-2013	-	-	120	193	168	-	-	-	-	-	-	481	Gov. Investment	Environmental Assessment Report is not required	12
3	F7	Collector/Feeder Road (Outer Ring Road - Rom Klao Section 1, North Side)	1.5	2	2010-2011	-	78	52	-	-	-	-	-	-	-	-	130	Gov. Investment	Environmental Assessment Report is not required	15
4	F5	Road linking Udomsuk - Eastern Outer Ring Road	3.5	2	2010-2011	-	606	404	-	-	-	-	-	-	-	-	1,010	Gov. Investment	Environmental Assessment Report is not required	16
5	F8	Collector/Feeder Road (Kheha Rom Klao - Rom Klao Section 2, North Side)	1.5	2	2010-2011	-	78	52	-	-	-	-	-	-	-	-	130	Gov. Investment	Environmental Assessment Report is not required	17
6	F4	Road linking Ram Kham Haeng Road	6.5	3	2010-2012	-	419	670	586	-	-	-	-	-	-	-	1,675	Gov. Investment	Environmental Assessment Report is not required	18
7	F12	Road linking Sri Nakharintra Road	9.0	3	2011-2013	-	-	741	1,185	1,037	-	-	-	-	-	-	2,963	Gov. Investment	Environmental Assessment Report is not required	19
8	F11	Road linking Ramkhamhaeng - Sukhumvit 77	10.0	3	2011-2013	-	-	1,155	1,848	1,617	-	-	-	-	-	-	4,620	Gov. Investment	Environmental Assessment Report is not required	20
9	F18	Road linking Navamintra Road - Highway No.34	17.5	4	2010-2013	-	1,474	5,159	5,159	2,948	-	-	-	-	-	-	14,740	Gov. Investment	Environmental Assessment Report is not required	21
10	F13	Collector/Feeder Road (Outer Ring Road - Rom Klao Section 1, South Side)	1.5	2	2012-2013	-	-	-	78	52	-	-	-	-	-	-	130	Gov. Investment	Environmental Assessment Report is not required	24
11	F14	Collector/Feeder Road (Kheha Rom Klao - Rom Klao Section 2, South Side)	1.5	2	2012-2013	-	-	-	78	52	-	-	-	-	-	-	130	Gov. Investment	Environmental Assessment Report is not required	25
Department of Highways																				
1	(AG8)*	The 3 rd Outer Ring Road	39.0	5	2010-2014	-	1,888	2,360	2,832	1,416	944	-	-	-	-	-	9,440	Gov. Investment	Environmental Impact Assessment within the Study Report for the Outer Ring Road of Bangkok Round 3 was done by the DOH, 2008	14
Department of Rural Roads																				
1	AG5	Main Road linking to Kingkaew Road	4.5	3	2010-2012	-	569	910	797	-	-	-	-	-	-	-	2,276	Gov. Investment	Environmental Assessment Report is not required	5
2	AG4	Main Road parallel to Wat Kingkaew Road	9.0	3	2010-2012	-	1,071	1,714	1,500	-	-	-	-	-	-	-	4,285	Gov. Investment	Environmental Assessment Report is not required	6
3	AG11	Truck route (Aerolane) into the Airport (South Side)	10.0	3	2011-2013	-	-	543	868	760	-	-	-	-	-	-	2,171	Gov. Investment	Environmental Assessment Report is not required	7
4	(AG12)	Truck route (Aerolane) into the Airport (North Side)	11.5	3	2011-2013	-	-	556	889	778	-	-	-	-	-	-	2,223	Gov. Investment	Environmental Assessment Report is not required	8
5	(AG13)	Main Road (Bang Bo - Bang Saothong)	10.5	3	2011-2013	-	-	592	946	828	-	-	-	-	-	-	2,366	Gov. Investment	Environmental Assessment Report is not required	9
6	AG10	New Main Road (Bang Pli - Suvarnabhumi Section 2, South Side)	1.8	2	2012-2013	-	-	-	294	196	-	-	-	-	-	-	490	Gov. Investment	Environmental Assessment Report is not required	10
7	AG7	New Main Road (Bang Pli - Suvarnabhumi Section 2, North Side)	2.5	3	2011-2013	-	-	173	277	242	-	-	-	-	-	-	692	Gov. Investment	Environmental Assessment Report is not required	13
8	F2	Road linking to Highway No.34	9.5	3	2011-2013	-	-	459	735	643	-	-	-	-	-	-	1,837	Gov. Investment	Environmental Assessment Report is not required	22
9	F3	Road (Highway No.7 - Highway No.34)	13.0	4	2010-2013	-	198	693	693	396	-	-	-	-	-	-	1,980	Gov. Investment	Environmental Assessment Report is not required	23
10	(F15)	Road linking Highway No.7 - Highway No.34	2.5	2	2012-2013	-	-	-	290	193	-	-	-	-	-	-	483	Gov. Investment	Environmental Assessment Report is not required	26

Source: The Consultant

Note:

- (1) () Project suggested by the Consultant
- (2) * Project that cannot be opened for service immediately at the end of the Action Plan
- (3) ** Priority in accordance with the Master Plan (Single Airport case) as shown in Table 4.4-2
- (4) **** Public-Private Partnerships: PPPs

4.5 Key Success Factors for the Implementation of the Action Plan

To accomplish the Action Plan, all stakeholders, including project owners, Bureau of Budget, Ministry of Finance, private developers, and surrounding communities, need to work closely, in order to achieve the objectives, while reducing the impact to communities and environment, as well as development in other parts of the country. Such factors are:

- 1) Increase the attractiveness for transport network investment. As network implementation according to the Action Plan requires a large amount of investment, normal sources of funding from the government, such as annual budget or soft loan may be inadequate. Since domestic financial market is still small, Public-Private Partnerships (PPPs), together with foreign direct investment, is likely to be the approach. The requirement for private capital during the Action Plan is shown in Table 4.5-1.

Table 4.5-1 Private Sector Investment for Rail Projects and Elevated /Expressway (Motorway) Projects During the Period of the Action Plan

Unit: Million Baht

Projects	Investment under the Action Plan				
	2009	2010	2011	2012	2013
Rail	4,609	11,285	11,341	5,866	2,933
Elevated /Expressway (Motorway)	-	10,323	14,000	15,742	6,467
Total	4,609	21,608	25,341	21,608	9,400

Source: The Consultant

Mobilization of private capital for transport project requires trust for the country, as well as the government itself. The government must show a clear policy and transparency. It must not create unfair conditions for private sector, e.g. allowing to have a competing project. In addition, the government must not interfere with project operation, or breach the agreed terms, e.g. toll manipulation.

Creation of an attractive investment atmosphere requires the government to allow commercially viable operation, with incentives for efficiency. Meanwhile, there needs to be transparent regulatory framework to equitably control all stakeholders.

- 2) Ability to mobilize capital from external source of fund.
In order to cope with the increasing demand for transport, the transport development in Suvarnabhumi Aerotropolis requires huge investment. Government agencies with an annual budget as a single source of funding need to adapt and explore the ability to mobilize funding from other sources, such as soft loan or bond.

Alternatively, there are other possibilities, such as service contract for construction and maintenance of road network within the specified area, e.g. municipality or Tambon boundary. In this case, the responsible agency will spread payments over the long term and in return the private contractor will absorb the maintenance risk. There should be penalties for failure to properly maintain road network, as well as incentives for keeping up good work. Through such mechanism, people will have a well-maintained road network, while the responsible agency will reduce its maintenance workload. This mechanism has been successfully implemented in many countries, such as UK, where it is called “Availability Payment Mechanism”. Meanwhile application of such a mechanism in Thailand still requires in depth analysis on the appropriate process, payment arrangements, etc. , so as to provide fair and transparent platform for public-private partnerships.



Office of Transport and Traffic Policy and Planning

Ministry of Transport

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