

MODERN INTER-MODAL TERMINAL DEVELOPMENT IN BANGKOK

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abstract: Various types of transport infrastructure have been planned and implemented to relieve traffic gridlock in Bangkok. To provide convenience to vehicle users and passengers and to increase efficiency of transport infrastructure, the first modern inter-modal terminal in Thailand is being developed. This paper focuses on the benefit which will result from this development.

1. INTRODUCTION

Over the past few years, northern Bangkok has experienced rapid growth and expansion, particularly along Phahonyothin, Wiphawadi Rangsit and Ratchadaphisek Roads. A vast number of office towers, condominiums, department stores, shopping plazas and residential estates have been sprung up and it is predicted that during the coming decade, this northern sector will emerge as one of Bangkok's prime business and commercial areas.

Today, Phahonyothin is one of Bangkok's main roads serving an ever increasing traffic volume, including the inter-city buses generated/attracted to/from the Bangkok Northern Bus Terminal (Mor Chit). In a day, there are as many as 150,000 bus passengers traveling on about 6,000 inter-city bus trips. In addition, up to 47 city bus routes (on Phahonyothin Road) carry approximately 700,000 passengers per day through this terminal. However, without major improvement, this important terminal will not be able to keep pace with the rapid growth of traffic demand from various types of transport infrastructure/modes, including MRT, public transport, expressways, and surface roads.

In this regard, Sun Estate Co., Ltd. has been awarded concessionaire of this important transport infrastructure; the Bangkok Terminal Project (BTP). That is to develop the existing Mor Chit Terminal to be a national transport center. The proposed development of the site in transport terms may be considered in four parts, including:

- 1) The depot (now under construction) for the elevated Bangkok Transit System Corporation (BTSC) which will occupy a designated area from about ground level to an elevation of 13.5 m.
- 2) The new inter-city bus terminal which will occupy part of the concourse level (Level) which is located immediately above the BTSC plus a further two levels (Levels 2 and 3).
- 3) The associated car park facility which will have a capacity in excess of 8,000 spaces above the inter-city bus terminal. Accordingly, the first level of parking will occur at Level 4. It is proposed to have 6 levels of elevated parking with a smaller basement parking section. Because of the elevated car park a major challenge in the access design is to provide adequate capacity via elevated external road links effectively linked to the internal circulation system.

4) A major retail and commercial complex development with a gross rentable area of about 300,000 square meters. It is planned that this development will occupy several levels on a site area facing Phahonyothin Road.

1.1 Objective

The development of an integrated inter-modal terminal at Mor Chit, so-called the Bangkok Terminal, has been an effort of the government. The major objectives in developing this substantial transport infrastructure are as follows:

- 1) To build a modern, international standard transport center that will help alleviate Bangkok traffic problems and play a vital role as the Bangkok's Gateway for the 21st Century.
- 2) To support the government policy on the concept of Public Private Participation (PPP).

1.2 Project Site

The proposed development site for an integrated inter-modal terminal or the Bangkok Terminal Project (BTP) is the present site being used for the inter-city bus terminal which serves bus routes to destinations in the north and northeast of Thailand. This site, shown in Figure 1, is known as Mor Chit Bus Terminal.

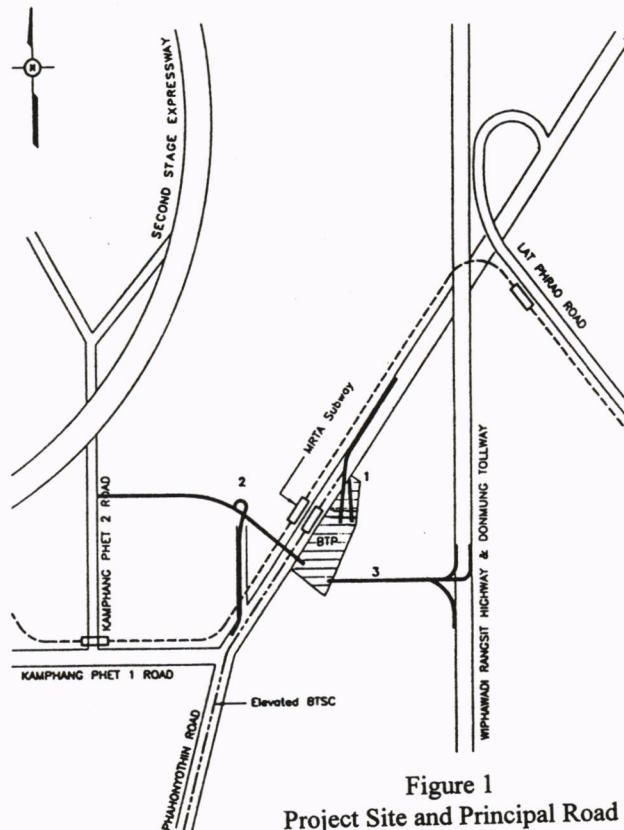


Figure 1
Project Site and Principal Road
Access to BTP

The primary frontage of the site will be on Phahonyothin Road which is a major north-south arterial road and is also the biggest bus corridor in Bangkok. There are some other major roads in the vicinity of the site. These include the Wiphawadi-Rangsit Road, the elevated Don Muang Tollway (over Wiphawadi Rangsit Road) to the east, the Second Stage Expressway (SES) to the west and Kamphaengphet 2 Road. In general, the proposed BTP site is strategically well placed to be served by roads, expressways, surface public transport and mass rapid transit systems.

2. TRANSPORT SYSTEMS FOR THE BTP

2.1 Transport Systems Integrated at the BTP

Multi - Modal transport systems which will be integrated at the BTP are shown in Table 1 and Figure 2.

Table 1
Transport System Integrated at the BTP

Public Transport	Private Transport
1. Bangkok Transit System 2. Metropolitan Rapid Transit Authority (MRTA) Subway 3. Inter-City Bus 4. City Bus 5. Taxi and Tuk-Tuk	1. Passenger Car 2. Motorcycle 3. External Elevated Ramps connected to : 3.1 Phahonyothin Rd. 3.2 Kamphaengphet II Rd. 3.3 Wibhawadi - Rangsit Rd. 3.4 Don Muang Tollway

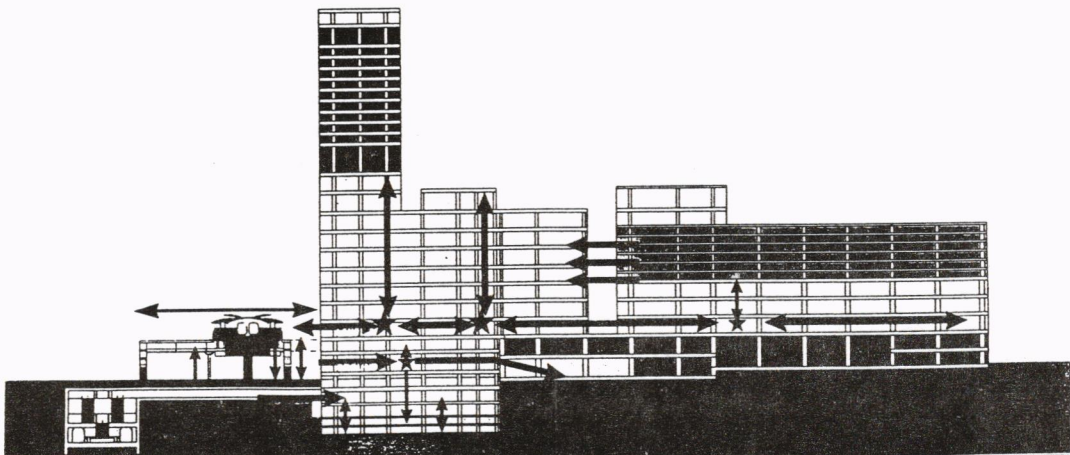


Figure 2
Interchange Between BTP and Various Transport Modes

2.2 Transport Systems in the Vicinity of the BTP

The following projects, shown in Table 2, are playing (or will play) a substantial role in improving traffic flows in the north-south corridor of Bangkok in which the BTP is incorporated.

Table 2
Transport Systems in the Vicinity of the BTP

Project	Status	Opening Year
1 Hopewell Expressway - and MRT	Under Construction	1998 (Rangsit-Yommarat , Hua Lamphong)
2 Second Stage Expressway - System (SES)	Operation	1993 (Sector A) 1996 (Sector B)
3 Don Muang Tollway (DMT)	Operation	1994
4 Third Stage Expressway - System (TES)	Completed Detailed Design	2000
5 Commuter Trains	Operation	more than 20 years
6 Guided Bus under the SES	Concessionaire was awarded	Before Year 2000
7 High Speed Train	Being planned	Being considered

These projects are briefly discussed below :

1) Hopewell Expressway and MRT (under construction): The Hopewell project is a skytrain and expressway being constructed under the BOT approach. It is a high capacity, heavy rail system and has the potential to link much of the city with the suburban areas. The Government has announced its intention to ensure that the system is integrated with the other two MRT systems proposed for the city, with the Hopewell providing the backbone of the system to which other systems would connect. From the Hopewell Bang Sue Station located in the vicinity area of the BTP, passengers can easily reach the BTP by using MRTA subway or buses. The Rangsit-Yommarat-Hua Lamphong route is scheduled to open by the end of 1998.

2) Second Stage Expressway System (SES): The SES is a 6-lane elevated expressway and is divided into 4 sectors. Sectors A and C, between Chaeng Wattana and Rama IX Rd. (20.4 km), were opened to traffic in September 1993 and Sector B, from Rama VI Rd. to Bang Khlo, was opened in late 1996.

3) Don Muang Tollway: With a total length of about 20 kms, it is an entirely elevated 6-lane expressway, connecting the northern end of the First Stage Expressway System (FES) with the Bangkok International Airport (BIA). The connection of DMT with BTP via an elevated road will, undoubtedly, improve traffic flow to/from the existing Mor Chit Terminal, which presently uses either Wiphawadi Rangsit Highway or Phahonyothin Road.

4) Third Stage Expressway System (TES, to be completed in 2000): The TES is in two sections. The northern section will connect Si Nakharin Road with Nonthaburi, passing through Bang Krap and acting as a north/northeastern Bangkok ring road. This section is 23 km in length. The southern section, which measures 12 km, leads from the end of the First Stage Expressway (FES) at Bang Na to Samut Prakan. The northern section is of

utmost importance to BTP. It would provide a link between SES and DMT which will result in multiple alternative routes to BTP.

5) State Railway of Thailand (SRT) commuter trains;

6) Guided Bus (to be implemented underneath the SES); and

7) High Speed Train (being planned to have a station in the Yan Phahon Area ; opposite to the BTP)

3. RESULTS OF ANALYSIS

Forecast of passengers at the BTP is shown in Table 3, below.

Table 3
Daily Passengers at Mor Chit Station

Transport Mode	Through Passenger						On-Off Passenger			
	1997		2001		2011		2001		2011	
	Passenger	%	Passenger	%	Passenger	%	Passenger	Transfer Ratio (%)	Passenger	Transfer Ratio (%)
City Bus	700,000	61.5	719,000	51.7	760,000	40.6	143,800	20.0	174,800	23.0
Inter-city Bus	150,000	13.2	179,000	12.9	260,000	13.9	179,000	100.0	260,000	100.0
BTS	--	--	200,000	14.4	255,000	13.6	200,000	100.0	255,000	100.0
MRTA	--	--	--	--	230,000	12.3	--	--	57,500	25.0
Passenger Car	230,000	20.2	230,000	16.5	270,000	14.4	34,500	15.0	48,600	18.0
Motorcycle	58,000	5.1	63,000	4.5	95,000	5.1	6,300	10.0	11,400	12.0
Total	1,138,000	100.0	1,391,000	100.0	1,870,000	100.0	563,600	40.5	807,300	43.2

The results of traffic and economic analysis are summarized as follows:

1) Access demand at the BTP consists of trips generated / attracted from the following: inter-city passengers; shoppers, employees; business activities; and goods. The BTP external access systems have been designed to provide sufficient capacity to serve such demand.

2) The critical volume to capacity ratio varies from 0.80-0.85. This is entirely appropriate, and ensures that the level of service of transport systems linking the BTP with external roads will be viewed in favorable terms by BTP clientele.

3) With two MRT systems, a portion of private car users will shift to MRTs. There are two main feeder transport systems to reach the BTP, including private transport and public transport modes. Those who use private transport to the BTP will park their cars using park-and-ride facilities, then transfer to MRTs. Those who come to the BTP by bus, taxi, tuk-tuk, Hopewell MRT or other public transport modes will transfer to MRTs at the BTP.

4) The existing modal split to/from Mor Chit Terminal is 55% by city buses, 40% by taxis, and 5% by cars. In the near future, with BTSC skytrain and MRTA subway in operation, modal split is expected to change to, as follows: 35% by buses; 21% BTSC; 14% MRTA; 27% taxis; and 3% cars.

5) External access plan has been formulated by integrating all relevant transportation systems with due consideration of traffic flow, operational characteristics of various vehicles and design standards.

6) As a result from the reduction of private vehicles on the road network, travel speed will increase, particularly on the roads in the north-south corridor. This will result in time savings and vehicle operating cost (VOC) savings. Time and VOC savings were estimated to be approximately 400 million Baht in the first year of operation ; year 2000.

7) Economic indicators were calculated to be:

- Economic Internal Rate of Return (EIRR) = 25.6%
- Net Present Value (NPV) = 6,377 Million Baht

The above figures are the returns to the country as a whole which is referred to as "the economic return", not the financial return which is the benefit to an individual person or an investor.

4. CONCLUSIONS

Conclusions and recommendations of the study are as follows:

1) Traffic volume in Bangkok and between Bangkok and other cities will continue to grow with the growth in the economy. In the project area, passenger traffic is forecasted to grow at an average annual rate of 5% and 3% over the years 1997 to 2001 and 2002 to 2011, respectively.

2) The Bangkok Terminal Project (BTP) is an important transport infrastructure which will play a substantial role in sustainable transport and economic development of the country. It will efficiently integrate various types of transport systems from which will result in time and VOC savings of trip makers. These types of saving are the direct benefit to the people in the project area, in Bangkok and in Thailand as a whole.

3) The BTP site is strategically well placed to be served by roads, expressways, public transport and mass rapid transit systems. Indeed, the project is the drawing point for surrounding communities. It is expected that the existing bus terminal at Mor Chit will become the First Integrated Inter-modal Terminal (FIT) in Thailand to provide advanced and comfortable travels with express & safe services.

4) The implementation of the BTP is economically viable.

5) External elevated ramps to Phahonyothin Rd., and Kamphaengphet 2 Rd. are a must.

6) If an elevated ramp to Don Muang Tollway is materialized, additional gain to road users will be obtained.

REFERENCES

Sun Estate Co., Ltd. (1997), **Facts about Bangkok Terminal.**