Thailand

Traffic Planning and Management Sector Loan

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Field Survey: August 2007 – March 2008

1. Project Profile and Japan's ODA Loan

Map of the project area:
Bangkok, Kingdom of Thailand

Congestion in the city of Bangkok

1.1 Background

Accompanying the rapid economic development in Thailand starting in the 1990s, it became apparent that there was regular traffic congestion in urban areas such as the Bangkok Metropolitan Region and that the traffic environment had deteriorated as seen in traffic accidents throughout Thailand. To resolve these issues and to realize steady economic growth, the Thai government had a master plan prepared by the Office of Commission for the Management of Road Traffic (OCMRT) [1] which is under the Office of the Prime Minister, in tandem with the 8th National Economic and Social Development Plan (1997–2000). According to this master plan, emphasis is to be placed on the promotion of measures for the following items in the traffic sector.

1) To promote the improvement of travel speed, efficiency of road usage will be boosted by enhancing the road network particularly in the city center and by resolving bottlenecks.
2) The quality and convenience of public transportation will be improved.
3) From the standpoint of improving the quality of life, traffic safety will be secured and environmental deterioration will be prevented.
4) The functions of agencies related to transportation will be strengthened, including those

[1] In June 1997, the name was changed to the Office of the Commission for the Management of Land Traffic (OCMLT).

dealing with the securing of funding sources and the legal framework.

To implement the above-mentioned priority measures for the traffic sector, it was decided to implement this ODA loan project which is composed of three components (policy and planning; project implementation; and coordination and consulting services) as a traffic planning and management sector loan.

This ex-post evaluation presents an evaluation of the traffic planning and management sector loan which was implemented due to the above-mentioned background.

1.2 Objective

The objective of this project is to meet three objectives of (i) improving the efficiency of road use, (ii) securing traffic safety, and (iii) enhancing the convenience of public transportation,by developing road networks and implementing programs for better traffic safety, thereby contributing to less traffic congestion and a better traffic environment.

1.3 Borrower / Executing Agency

Borrower: Ministry of Finance, Thailand

Executing Agency: Office of Commission for the Management of Land Traffic (OCMLT)

1.4 Outline of Loan Agreement

Loan Amount / Loan Disbursed Amount	4,148 million yen / 3,205 million yen	
Exchange of Notes / Loan Agreement	September 1998 / September 1998	
Terms and Conditions - Interest Rate - Repayment Period (Grace Period) - Procurement	Main portion 2.2% 25 years (7 years) General untied	Consulting service portion 0.75% 40 years (10 years) Bilateral tied
Final Disbursement Date	January 2006	
Main Contractors (only contracts over 1 billion yen)	Sino-Thai Engineering & Construction Public Co., Ltd. (Thailand)	
Consulting Services (only contracts over 100 million yen)	・ Japan Railway Technical Service (Japan), Team Consulting Engineering and Management Co., Ltd., (Thailand), Tesco Ltd. (Thailand), Tonichi Engineering Consultants, Inc. (Japan) ・ Japan Railway Technical Service (Japan), Asian Engineering Consultants Co., Ltd. (Thailand), Tesco Ltd. (Thailand), Transconsult Co., Ltd. (Thailand), Pacific Consultants International (Japan) ・ Asian Engineering Consultants Co., Ltd. (Thailand), Transconsult Co., Ltd.	

	(Thailand), Pacific Consultants International (Japan)
Feasibility Study (F/S), etc.	N.A.

2. Evaluation Result (rating: B)

2.1 Relevance (rating: a)

2.1.1 Relevance at the time of appraisal

To relieve the traffic congestion in the Bangkok Metropolitan Region which accompanies rapid economic growth and to improve the traffic environment across Thailand with the aim of achieving steady economic growth, this project planned to implement the following points. As measures to relieve the traffic congestion in the Bangkok Metropolitan Region, together with reviewing the bus routes and service schedule of the Bangkok Mass Transit Authority (BMTA) and drawing up an intermodal integration plan, flyovers, road widening, and new road building were planned in the Bangkok Metropolitan Area and its environs. Moreover, traffic environment improvements were planned which include traffic safety measures in response to the increased number of traffic accidents in the city of Chiang Mai.

The above plans were all in accordance with the 8th National Economic and Social Development Plan and the master plan produced by OCMRT, and their relevance was judged as being high.

2.1.2 Relevance at the time of evaluation

At the time of this ex-post evaluation, in continuation from the 8th National Economic and Social Development Plan as well as the master plan produced by the OCMRT, the 9th National Economic and Social Development Plan (2001–2006) had been announced. In keeping with the policy of the 9th National Economic and Social Development Plan, a strategy for traffic environment improvement in the traffic sector was prepared by the Office of Transport and Traffic Policy and Planning (OTP) and is summarized as follows.

1) Supply strategic traffic infrastructure
2) Construct a comprehensive, sustainable IT system for development of traffic infrastructure
3) Strengthen management capabilities for traffic infrastructure construction that is cost efficient, comprehensive, and swift

In view of the above policy, the objectives of this project – (1) review of the bus routes and service schedule of BMTA, (2) an intermodal integration plan, (3) flyovers, road widening, and new road construction in the Bangkok Metropolitan Area and its environs, and (4) traffic environment improvement, including traffic safety – are all judged to be consistent with the strategic supply of traffic infrastructure as well as with the comprehensive and swift

construction of traffic infrastructure, in accordance with the 9th National Economic and Social Development Plan.

Given the specific items mentioned above, implementation of this project is consistent with the national plan, etc., both at the time of the appraisal and at the time of the ex-post evaluation. Therefore, the relevance of the project implementation is extremely high.

2.2 Efficiency (rating: b)

2.2.1 Output

This project is composed of three components: policy and planning (Component 1), project implementation (Component 2), and coordination and consulting services (Component 3). Each component is composed of the following items.

(1) Component 1: Policy and Planning
   1) Study for BMTA bus route planning and service schedule coordination
   2) Intermodal integration plan

(2) Component 2: Project Implementation
   1) Road network construction project in Bangkok and its environs
   2) Traffic safety improvement project in Chiang Mai

(3) Component 3: Coordination and consulting services

Table 1 shows a comparison of the planned output and actual output of the project.

Table 1: Comparison of Output

Planned	Actual
<u>Component 1: Policy and Planning</u> 1. Study of bus route reorganization 2. Intermodal integration 1) Preparation of master plan (URMAP) for an urban mass transit railway in the Bangkok Metropolitan Region 2) Implementation of a feasibility study on the Southwestern Intermodal Station and Mae Klong Line 3) Preparation of a traffic and urban development master plan	<u>Component 1: Policy and Planning</u> 1. Study of bus route reorganization 2. Intermodal integration 1) Preparation of master plan (URMAP) for an urban mass transit railway in the Bangkok Metropolitan Region 2) Implementation of a feasibility study on the Southwestern Intermodal Station and Mae Klong Line 3) Preparation of a facilities plan for intermodal transfers (IMAC) in the Bangkok Metropolitan Region
<u>Component 2: Project Implementation</u> 1. Road network construction 1) Elevated railway crossing at Bangkoonithien Road	<u>Component 2: Project Implementation</u> 1. Road network construction 1) Elevated railway crossing at Bangkoonithien Road

Construction of flyovers (4 locations, total length: 1.0 km) 2) Sukhapibal 3 Road Road widening (total length: 4.65 km, from 2 to 8 lanes) 3) Sai Kor 2 Chonburi Road widening (total length: 2.0 km, from 2 to 4 lanes) 4) Soi Bearing – Srinakarin New road construction (4 lanes, total length: 1.030 km) ・ 2. Traffic safety improvement project (signal installation project in the city of Chiang Mai) Pedestrian bridges in 19 locations ・ Pedestrian signals in 22 locations	Cancelled due to protests by local residents 2) Sukhapibal 3 Road ・ Road widening (8 lanes, total length: 4.637 km) ・ Addition of construction of flyovers in 2 locations (4 lanes total, total length: 0.522 km and 0.464 km) 3) Sai Kor 2 Chonburi ・ Road widening (4 lanes, total length: 1,769 km) ・ Addition of construction of flyover in 1 location (2 lanes, total length: 0.711 km) 4) Soi Bearing – Srinakarin New road construction (4 lanes, total length: 1.030 km) 2. Traffic safety improvement project (signal installation project in the city of Chiang Mai) Location of signals in Chiang Mai (39 locations total) ・ In front of kindergartens and elementary schools: 5 ・ In front of high schools and colleges: 11 ・ In front of hospitals: 2 ・ In shopping areas: 3
<u>Component 3: Coordination and Consulting Services</u> Management and coordination of a sector loan	<u>Component 3: Coordination and Consulting Services</u> Consultants were hired for 108.99 MM, and various reports were submitted.

As shown in Table 1, the output consisting of Components 1 through 3 in this project was carried out basically according to the original plan, except for part of Component 2 (project implementation).

Component 1 (policy and planning) and Component 3 (coordination and consulting services) consisted mainly of the implementation of study. For this reason, reference was made to the evaluations by OCMLT, the executing agency, to confirm the content of the output, and it was found that the OCMLT evaluations of the reports produced by the hired consultants ranged from 5 points (excellent) to 4 points (good), with the highest possible score being 5 points. Given this, the quality of the above study results is evaluated as being high.

Meanwhile, changes occurred in Component 2, which was the actual implementation of the project, due to the following reasons.

1) Road network construction

Construction of the flyovers on Bangkoonithien Road (4 locations; total length: 1.0 km)

was cancelled due to protests by local residents concerning the negative affect on the scenery and the noise during construction, etc. Furthermore, there were slight changes in other locations, consisting only of the addition of flyover construction in one or two locations, while road widening and new road construction was implemented basically according to plan.

2) Traffic safety improvement project (signal installation project in the city of Chiang Mai)

The pedestrian bridges which were originally planned were all changed to pedestrian signals due to complaints from residents concerning the negative affect on the scenery. Moreover, the number of installation locations was changed from 41 to 39, and of those, one has been removed and relocated.

2.2.2 Project period

Table 2 shows a comparison of the planned project period and the actual project period.

Table 2: Comparison of Project Period

Planned	Actual
<u>Component 1: Policy and Planning</u> 1. Study of bus route reorganization ・ Consultant selection: January–June 1999 ・ Implementation period: July 1999 – September 2000 2. Intermodal integration Consultant selection: January–June 1999 Implementation period: July 1999 – June 2000	<u>Component 1: Policy and Planning</u> 1. Study of bus route reorganization 1. Consultant selection: May 2001 2. Implementation period: February 2003 – February 2004 2. Intermodal integration 1) Master plan (URMAP) for an urban mass transit railway in the Bangkok Metropolitan Region ・ Consultant selection: June 1999 – November 2003 ・ Implementation period: June 2000 – December 2001 2) Facilities plan for intermodal transfers (IMAC) in the Bangkok Metropolitan Region ・ Consultant selection: March 2003 – December 2004 ・ Implementation period: January 2004 – September 2005
<u>Component 2: Project Implementation</u> 1. Road network construction ・ Consultant selection: January–May 1999	<u>Component 2: Project Implementation</u> 1. Road network construction ・ Consultant selection: January–September

・ Implementation period: April 1999 – May 2001 ・ Construction bidding preparation and bidding period: January–June 1999 ・ Construction implementation period: July 1999 – May 2001 2. Traffic safety improvement project (signal installation project in the city of Chiang Mai) ・ Consultant selection: January–March 1999 ・ Construction implementation period: April–September 1999	2003 ・ Implementation period: August 2000 – March 2005 ・ Construction bidding preparation and bidding period: November 1999 – September 2003 ・ Construction implementation period: August 2000 – March 2005 2. Traffic safety improvement project (signal installation project in the city of Chiang Mai) ・ Consultant selection: consultants not hired ・ Construction bidding preparation and bidding period: August 2002 – March 2003 ・ Construction implementation period: August 2003 – April 2004
<u>Component 3: Coordination and Consulting Services</u> ・ Consultant selection: January–March 1999 ・ Implementation period: April 1999 – December 2001	<u>Component 3: Coordination and Consulting Services</u> ・ Consultant selection: August 1999 ・ Implementation period: August 1999 – January 2004

As shown on Table 2, the planned project period was from January 1999 to December 2001 (3 years, 0 months), but the actual project period was from June 1999 to March 2005 (5 years, 10 months), which represents a delay of 3 years and 3 months (194% of the planned period).

The reasons for the delay are summarized as follows.

Firstly, concerning Component 1, the delay in the bus route reorganization study led to a delay in the selection of consultants because the study was to be carried out based on the results of the URMAP work.

The reasons for the delay in intermodal integration are summarized as follows.

- Time was required to complete TOR in URMAP, and bidding was delayed by half a year. Moreover, because time was required to respond to and make adjustments for comments from related institutions during the implementation of the study, the completion of the final report was delayed.
- There was a difference of opinion between the consultant and OTP concerning the Bangkok Southern Terminal Center, and time was required to reach an agreement.
- Time was required to complete TOR in IMAC, and time was also required for selection of consultants because one of the consultants raised an objection about the bidding results.

Concerning Component 2, the start of road network construction was slightly delayed compared to the plan for the items actually implemented. However, there was no conspicuous delay that impacted the progress of the project. Meanwhile in the traffic safety improvement

project (signal installation project in the city of Chiang Mai), delays occurred due to the following reasons.

- Originally it was planned to construct pedestrian bridges, but because there was opposition from residents who said that the pedestrian bridges were unbecoming to the scenery of central Chiang Mai, the pedestrian bridges were ultimately cancelled. These negotiations were a factor in the delay.
- Regarding the signal installation, local residents who operated businesses complained that nearby signboards would become difficult to see, and time was required for negotiations.

The delay in Component 3, the coordination and consultant services, was due to the fact that the consultant hiring period was lengthened in response to the above-mentioned delays in Components 1 and 2.

2.2.3 Project cost

Table 3 shows a comparison of the planned project cost and the actual project cost.

Table 3: Comparison of Project Cost

Planned	Actual
Total project cost: 9,147 million yen (Foreign currency: 4,148 million yen, Local currency: 4,999 million yen, ODA loan portion limit: 4,148 million yen)	Total project cost: 3,205 million yen (Foreign currency: 3,205 million yen, Total ODA loan portion: 3,205 million yen)

As shown in table 3, the original project cost was 9,147 million yen, but the actual project cost was less, at 3,205 million yen (35% of the planned amount). The reasons for the cost underrun are (1) the flyovers were cancelled, (2) reserve funds were not used, (3) costs were lowered through bidding, and (4) changes in the exchange rate.

Given the above results, the efficiency of this project is evaluated as moderate because, while the project cost was less than originally planned, the project period was extended beyond the original schedule.

2.3 Effectiveness (rating: a)

2.3.1 Operation and effect indicators

At the stage of this ex-post evaluation, it can be said that the average speed on major roads was steadily improving during 2004–2005 following the opening of a mass transit system in Bangkok (i.e., BTS and MRT Blue Line) compared to 2003 prior to the opening of the subway, as shown on Table 4. This trend is conspicuous in the outlying areas of Rama IX, Ladprao, and Phahon Yothin.

Table 4: Average Speeds on Major Roads (2003–2005)

(Unit: km/hr)

Road Name	2003	2004	2005
Rama IV	18.25	19.45	20.27
Phayathai	11.92	11.31	12.43
Silom	10.30	10.43	11.57
Satun	10.03	11.72	11.30
Asok	15.42	15.38	14.68
Phetburi	21.45	21.15	21.29
Ratchadaphisek	29.01	29.56	29.43
Rama IX	27.53	29.68	38.17
Ladprao	18.24	21.57	21.49
Phahon Yothin	34.16	30.62	34.50

Concerning the improvement of bus routes which was studied in this project, changes were made in 18 bus routes at 7 stations, as shown in Table 5, from among a total of 254 bus routes in Bangkok (Numbers 1 to 207 in Bangkok and Numbers 501 to 547 outside Bangkok). Consultations are currently underway concerning other bus routes between BMTA and the Mass Rapid Transit Authority (MRTA), which is the executing agency for the subway.

Table 5: Bus Route Numbers following Route Changes

Station Name	Bus Route No. （BMTA）
Kamphaengphet	77, 145, 536
Ladprao	96, 179, 185, 503, 504, 516
Huai Khwang	12
Thailand Cultural Center	137, 517
Phetburi	11, 93, 206
Queen Sirikit National Convention Center	2, 25
Sam Yam	45

Regarding the improvement of bus routes, it is likely that the facilities plan for intermodal transfers in the Bangkok Metropolitan Region (IMAC), in addition to reorganizing bus routes into a feeder system for mass transit, will contribute to greater alleviation of congestion in the Bangkok Metropolitan Region.

2.3.2 Internal rate of return

In addition to the fact that the internal rate of return (IRR) was not calculated at the time of appraisal, a quantitative evaluation of the project is impossible given its nature, and so the IRR was not calculated in the ex-post evaluation.

2.3.3 Qualitative effects

The master plan (URMAP) of the urban mass transit railway in the Bangkok Metropolitan Region which was drawn up by this project was adopted as a Cabinet decision and provides a guide for construction of mass transit in the future. The master plan may be positively evaluated not only because of the improvement in the public transportation network including buses and railways, but also because of the focus it places on all transportation mobility, accessibility, and sustainability, including that in the Bangkok area.

Moreover, aside from the fact that the feasibility study for the Southwestern Intermodal Station and Mae Klong Line resulted in a reduction of scale because land acquisition was difficult, the effectiveness of the studies implemented under this project is evaluated as high because they were utilized, by and large, in the planning of urban transportation network construction.

The effectiveness of the signal installation project in the city of Chiang Mai is evaluated as high because ordinarily persons used to cross between gaps in traffic where there were no signals and this project installed signals at such dangerous crossing points.

2.4 Impact

Because Components 1 and 3 consisted only of studies, they were excluded from the evaluation of impact.

2.4.1 Benefit to the target area and beneficiaries

According to a field questionnaire of 20 persons in each road work location concerning the road network construction, most users responded that both vehicle speed and safety had been improved.

Moreover, according to interviews implemented by related bodies with a total of 20 pedestrians selected at random in 16 survey locations in the city of Chiang Mai concerning the signal installation project in Chiang Mai as a traffic safety improvement project and also according to trend surveys of pedestrians, most of the pedestrians responded that safety had been increased by the installation of the pedestrian signals.

Furthermore, during the ex-post evaluation (December 18, 2007), 30-minute surveys were implemented in three locations where pedestrian signals were installed in Chiang Mai (in front of the market, hospital, and high school) concerning usage of the signals, as shown in Table 6.

Table 6: Result of Field Survey (implemented December 18, 2007)

	In front of the market	In front of the hospital	In front of the high school
Cross using signal	56 persons	34 persons	180 persons
Cross without using signal	16 persons	1 person	0 persons

Number of vehicles that entered the pedestrian crosswalk during a red light	21 vehicles	17 vehicles	0 vehicles

The survey results displayed in Table 6 may be summarized as follows.

1) In front of the market, despite the fact that this is a location with heavy traffic volume, it was found that approximately 20% of pedestrians do not use the signal.
2) In front of the hospital, it was found that all persons use the signal, with the exception of one. However, it was found that 17 vehicles entered the pedestrian crosswalk during a red light, and as indicated in the Project Completion Report (PCR), conditions are such that pedestrian safety is not secured.
3) In front of the high school, as many as 180 persons used the signal, and its effectiveness is verified. Furthermore, because usage of the signal at this location is concentrated around the times students go to and leave high school, and users during other time periods are extremely limited, the survey was implemented during the time when students were leaving school. The fact that no vehicles entered the crosswalk during red lights is interpreted at being due to the fact that a police officer acted as an after-school crossing guard at the time of this survey. It may be assumed that the school instructs the students to obey the signal since it was installed in the given location because of the high school. However, given the results from other locations, one issue is whether or not vehicles are usually obeying red lights when no police are present, and further observation appears to be necessary henceforth.

2.4.2 Impact on the natural environment

Because the construction is a small-scale project, its impact on the natural environment is small, and it was confirmed with the executing agency that there are no particular problems. However, there was an area that was impacted by noise during construction.

2.4.3 Resident relocation and land acquisition

Since the Thai government acquired land at market price prior to the project implementation, no problems occurred in land acquisition. Furthermore, no resident relocation occurred in conjunction with this project.

Given the above results, the project’s effectiveness and impact is evaluated as being high.

2.5 Sustainability (rating: b)

2.5.1 Executing agency

2.5.1.1 Operation and maintenance system

The management agencies for O/M in Component 2 are as shown on Table 7.

Table 7: Management Agency for Operation and Maintenance in the Project

	Place	Item	Management Agency
Road Network Construction	Sukhapibal 3 Road	Flyover (2 locations)	BMA, Minburi District Director
	Sai Kor 2 Chonburi	Flyover (1 location)	DOR, Ban Suan Municipality (Chonburi Province)
	Soi Bearing – Srinakarin	New road construction	DOR, Samutprakarn Office
Traffic Safety Improvement Project (signal installation project in the city of Chiang Mai)	Chiang Mai	Signal	Engineering Division, CMM

Furthermore, the O/M system shown in Table 7 is basically the same as that at the time of appraisal, and it is concluded that there are no problems in particular.

2.5.1.2 Technical capacity

There is no particular mention of technical capacity for O/M at the time of appraisal, and so the following items were confirmed at the time of this evaluation.

First, no special technical capacity is required for the O/M of flyovers and newly constructed roads related to the road network construction.

Meanwhile, technical capacity and knowledge concerning electricity is necessary for the O/M of the signal installation project in Chiang Mai. For this reason, Chiang Mai city consigns O/M to Chiang Mai Anan Electrics, a private company. At Chiang Mai Anan Electrics, there are 15 to 16 engineers permanently stationed as maintenance personnel, and it may be concluded that adequate technical capacity for O/M has been secured.

2.5.1.3 Financial status

There is no particular mention of the financial status for O/M at the time of appraisal, and so the following items were confirmed at the time of this evaluation.

The budget is allocated as follows for the road network construction.

1) Sukhapibal 3 Road and 2 flyovers

   BMA, which manages Sukhapibal 3 Road and 2 flyovers, allocated 396,691,300 baht for road maintenance and repair in 2007.

2) Sai Kor 2 Chonburi and 1 flyover

   Ban Suan Municipality (Chonburi Province), which manages Sai Kor 2 Chonburi and 1 flyover, allocated a budget of 60,000 baht/km for maintenance and repair of the area

concerned.

3) Soi Bearing – Srinakarin

DOR, which manages Soi Bearing – Srinakarin, allocated 150,000 baht in 2005 and 160,000 baht in 2006 for the maintenance and repair of the road in the area concerned.

For the signal installation project in Chiang Mai, a budget of 290,000 baht was allocated for maintenance and repair of the signals. Moreover, Chiang Mai city consigned maintenance and repair to a private company (at 550 baht/location/day).

It was confirmed that the amounts of the O/M budgets in each of the above-mentioned projects are appropriate for the management agencies.

2.5.2 Operation and maintenance status

There is no particular mention of the O/M status at the time of appraisal, and so the following items were confirmed at the time of this evaluation.

Table 8 indicates the O/M status in the projects of Component 2.

Table 8: Current Condition of Operation and Maintenance

	Location	Item	Current Condition
Road Network Construction	Sukhapibal 3 Road	Flyover (2 locations)	・ In the event of road subsidence, etc., BMA implements repair work. ・ Daily O/M (cleaning and greenery management) is carried out by Minburi District.
	Sai Kor 2 Chonburi	Flyover (1 location)	・ During the 2 years following road completion, the construction company is responsible for management. ・ In 2002, the Department of Rural Roads (DOR) transferred the road to the Ban Suan Municipality. ・ Currently, the Ban Suan Municipality is conducting O/M.
	Soi Bearing – Srinakarin	New road construction	・ The Samutprakarn Office of DOR conducts O/M and repair.
Traffic Safety Improvement Project (signal installation project in the city of Chiang Mai)	Chiang Mai	Signal	・ Chiang Mai city consigns signal O/M for the entire city to a private company (Chiang Mai Anan Electrics). ・ The private company employs 15 to 16 engineers who make daily rounds to the signals. ・ The private company submits monthly reports to CMM.

Among the projects indicated in Table 8, it was confirmed through the field survey that the O/M and repair status is satisfactory for flyovers in 3 locations (Sukhapibal 3 Road, Sai Kor 2 Chonburi, and Soi Bearing – Srinakarin) and for the new road construction related to the road network construction.

Meanwhile, regarding the signal installation project in the city of Chiang Mai, it was specifically confirmed, through interviews with the city of Chiang Mai, that O/M and repair are being conducted in the following forms.

- The private company (Chiang Mai Anan Electrics) to which O/M and repair are consigned checks signal operation daily, and the result of the checking is sent by fax to Chiang Mai's Area Traffic Control (ATC).
- Signals that are not operating are repaired within 7 days.
- Consignment fee: 550 baht/location/day

Moreover, the operating condition of pedestrian signals in Chiang Mai as confirmed in the field survey implemented in December 2007 was as follows.

Table 9: Operating Condition of Pedestrian Signals in Chiang Mai

Signals with serious malfunction Condition: ・ Signal does not operate ・ Push-button does not operate	Signals with light malfunction Condition: ・ No hindrance to usage, some signal lights do not operate ・ Some signal lights are damaged
5 of 39 locations	13 of 39 locations

As shown in Table 9, 15% of all pedestrian signals (5 of 39 locations) were found to have a serious malfunction. Moreover, it was ascertained that as many as 50% of the signals, including those with light malfunctions, (18 of 39 locations) have problems. Consequently, the result of the evaluation is that there are issues in the O/M status of pedestrian signals in Chiang Mai.

Given the above, although there are problems in the O/M status of pedestrian signals in Chiang Mai, there are no particular problems in the other sub-projects. Thus, the result of the evaluation is that there is no problem with the sustainability of this project by and large.

3. Conclusion, Lessons Learned and Recommendations

3.1 Conclusion

Although the overall actual project period was delayed 194% compared to the planned project period and although there are some issues in O/M, the project's efficiency and effectiveness are judged to be high. Therefore, the evaluation of this project is high.

3.2 Lessons Learned

The following items may be mentioned as lessons learned from the evaluation results concerning this project.

1) In Component 1 (policy and planning), delays occurred in bidding due to the time required to prepare TOR, and delays occurred due to the time required for measures and coordination among related bodies. To respond to these issues, it is expected that the project's executing agency will exhibit leadership with regard to procurement processing and coordination with related bodies.
2) To respond to the protest by residents which caused the cancellation of flyover construction (in Bangkok suburbs) and the cancellation of pedestrian bridge construction (in Chiang Mai city) in Component 2 (project implementation), it appears indispensable to present adequate explanations in advance to the local residents and to hold sufficient public hearings.

3.3 Recommendations

While keeping in mind that there are aspects concerning future sustainability which cannot be clarified during a short period following completion, the following are presented as recommendations for OCMLT, the executing agency.

1) Improvement of bus routes is currently under discussion and has not reached implementation. However, because traffic congestion is beginning to improve accompanying the operation of other forms of mass transit (BTS and MRT Blue Line), it is likely that improvement of bus routes as a feeder system for mass transit, as studied in this project, will contribute to further alleviation of traffic congestion.
2) Measures should be continued for intermodal integration involving transfers between mass transit and buses and between water transportation and buses, etc., because it will be extremely effective henceforth to connect with other mass transit developments (BTS and MRT Blue Line).
3) Flyover construction, road widening, and new road construction projects in the Bangkok Metropolitan Region should be continued because the results of the questionnaire show that they have led to improvement in urban traffic.

Comparison of the Original and Actual Scope

Item	Planned	Actual
(1) Output	Component 1 1. Study of bus route reorganization 2. Intermodal integration Component 2 1. Road network construction 1) Elevated railway crossing at Bangkoonithien Road Construction of flyovers (4 locations, total length: 1.0 km) 2) Sukhapibal 3 Road Road widening (total length: 4.65 km, from 2 to 8 lanes) 3) Sai Kor 2 Chonburi Road widening (total length: 2.0 km, from 2 to 4 lanes) 4) Soi Bearing – Srinakarin New road construction (4 lanes, total length: 1.030 km) 2. Traffic safety improvement project ・ Pedestrian bridges in 19 locations ・ Pedestrian signals in 22 locations Component 3 Management and coordination of sector loan	Component 1 1. Study of bus route reorganization 2. Intermodal integration Component 2 1. Road network construction 1) Elevated railway crossing at Bangkoonithien Road Cancelled due to protests by local residents 2) Widening of Sukhapibal 3 Road ・ Road widening (8 lanes, total length: 4.637 km) ・ Addition of construction of flyover in 2 locations (4 lanes total, total length: 0.522 km and 0.464 km) 3) Sai Kor 2 Chonburi ・ Road widening (4 lanes, total length: 1,769 km) ・ Addition of construction of flyover in 1 location (2 lanes, total length: 0.711 km) 4) Soi Bearing – Srinakarin New road construction (4 lanes, total length: 1.030 km) 2. Traffic safety improvement project ・ Pedestrian bridges cancelled ・ Pedestrian signals installed (total 39 locations) Component 3 Management and coordination of sector loan
(2) Project Period	January 1999 – December 2001 (3 years, 0 months)	June 1999 – March 2005 (5 years, 10 months)

(3) Project Cost		
Foreign currency	4,148 million yen	3,205 million yen
Local currency	4,999 million yen	0 million yen
	(15,971 baht)	(0 baht)
Total	9,147 million yen	3,205 million yen
ODA loan portion	4,148 million yen	3,205 million yen
Exchange rate	1 baht = 3.1 yen	1 baht = 2.97 yen
	(as of April 1998)	(average from April 1997 to March 2006)