Kingdom of Thailand

Ex-Post Evaluation of Japanese ODA Loan Project
Pak Kret Bridge and Connecting Road Construction Project

Yasuhiro Kawabata, Sanshu Engineering Consultant

1. Project Description

Location of Project Site

Pak Kret Bridge

1.1 Background

Thailand's 7th National Economic and Social Development Plan (1992−1996) have three major goals: (1) maintenance of sound economic growth; (2) dispersion of income to regional areas; and (3) promotion of human resources development, environmental protection, and improvement in quality of life. The succeeding 8th National Economic and Social Development Plan (1997−2001), recognizing "human beings" as key, focused on economic development, as well as achievement of other development targets and objectives in order to emphasize social aspects more. However, due to the financial crisis that occurred in July 1997, the 9th Plan has to be revised substantially. The revised Plan was to focus on the following four agenda: (1) reconstruction of economy and assurance of stability; (2) alleviation of impacts to the people; (3) reform the economic structures; and (4) establishment of superior government.

At the time of appraisal in 1997, as the capital city, Bangkok was developing and expanding, the population of Nonthaburi District in the Northern Bangkok area had been increasing rapidly. Although the west bank area of Chao Phraya River was mostly agricultural land, the land development was expanding along the Bangkok Outer Ring Road. Thus, development of a residential area was anticipated in the neighboring areas. While high traffic demand was anticipated in the west bank area of Chao Phraya River as population increased, there was only a small number of bridges spanning Chao Phraya River in the northern Bangkok area compared with that in the central area, and traffic flow for the east-west direction was restricted. Moreover, Bangkok Outer Ring Road was the only major road for the north-south direction in the western

bank area, and the road network had not been well established.

1.2 Project Outline

The project objective is to contribute to the economic development in Nonthaburi District in the northern Bangkok area by alleviating traffic congestion in the project target area, promoting development and activating land use, and improving the road network by constructing the east-west (including Pak Kret Bridge) and the north-south roads in Nonthaburi District. The location of the project site is shown in Figure 1.

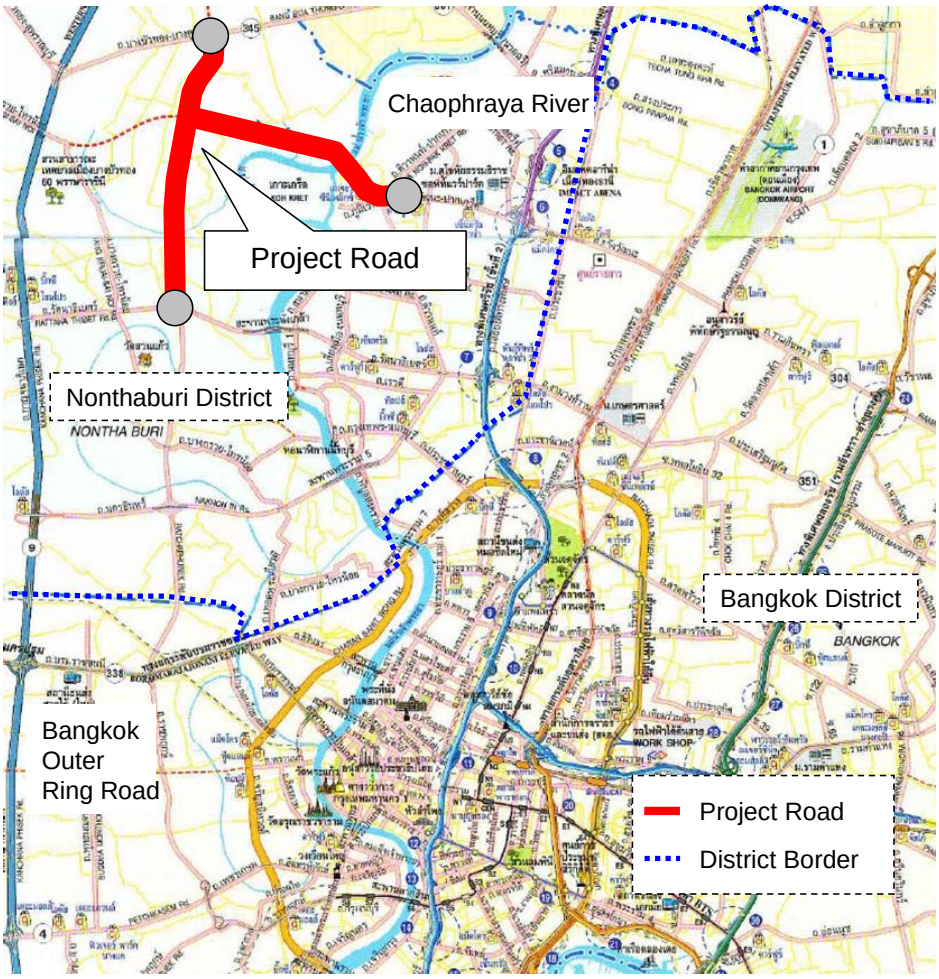

Figure 1　Location of Project Site

Approved Amount / Disbursed Amount	6,807 million yen / 4,964 million yen
Exchange of Notes Date / Loan Agreement Signing Date	September 1997/ September 1997
Terms and Conditions	Interest Rate: 2.7%; Repayment Period: 25years (Grace Period: 7 years) ; Conditions for Procurement: General Untied
Borrower / Executing Agency	The Government of Kingdom of Thailand / Department of Rural Roads, Ministry of Transport[1]
Final Disbursement Date	September 2007
Main Contractors (Over 1 billion yen)	Taisei Construction Co. Ltd. (Japan)/Sino-Thai Engineering and Construction Public Co., Ltd. (Thailand) JV/Mitsui Sumitomo Construction Co. Ltd. (Japan)
Main Consultant (Over 100 million yen)	None
Feasibility Studies, etc.	F/S by Department of Public Works, Ministry of Interior (January 1994)
Related projects	Wat Nakornin Bridge and Connecting Road Construction Project (I) (II) (Japanese ODA funded in 1995-1996, post evaluated in 2006)[2]

2. Outline of the Evaluation Study

2.1 External Evaluator

Yasuhiro Kawabata, Sanshu Engineering Consultant

2.2 Duration of Evaluation Study

Duration of the Study: December, 2009 - September, 2010

Duration of the Field Study: March 21st – 27th , 2010 and May 8th – 17th , 2010

3. Results of the Evaluation (Overall Rating: A)

3.1 Relevance (Rating: a)

3.1.1 Relevance with the Development Plan of Thailand

Following the financial crisis in July 1997, Thailand's 8th National Economic and Social Development Plan focused on the following four agenda: (1) reconstruction of economy and

[1] Originally, the executing agency was Public Works Department (PWD) of the Ministry of Interior. However, due to reorganization of the Thai central government in October 2002, the responsibility for the project was transferred to Department of Rural Roads of the Ministry of Transport.

[2] The North-South Road included in the project is connected with Ratcha Phruk Road (North-south Road) included in the Wat Nakornin Bridge and Connecting Road Construction Project in the southern extended section.

assurance of stability; (2) alleviation of impacts to the people; (3) reform the economic structures, and (4) establishment of superior government. Under such social and economic conditions, development projects in Bangkok Metropolitan area, which is the center of political and economic activities, were essential for reconstruction of the country's economy and assurance of stability. Implementation of infrastructure development, particularly alleviation of traffic congestion in Bangkok, was one of the top priority agenda. The subject project was one of three bridge projects in the Bangkok area, which was classified as high priority project under the 7th National Economic and Social Development Plan (1992-1996).

The current 10th National Economic and Social Development Plan (2007-2011) focuses on the sustainable economic development seeking establishment of well-balanced communities, or "communities filled with green and happiness". In order to achieve this target, five strategies were established. One of the strategies is regarding national economy, focusing on "development of competitive economy, creation of value-added goods while retaining the Thai identity, and improvement of economic and investment infrastructures to attract foreign direct investment". In particular, the importance of infrastructure development (including development of efficient transport network in the Bangkok Metropolitan area and its vicinity) is being emphasized.

According to the National Regional Plan (2008), prepared by the Department of Public Works and Department of Town and Country Planning of the Ministry of Interior, Bangkok is proposed to be a: (1) compact city; (2) world-class city (a global city); and (3) hub for Bangkok's regional economy, export and transport. Nonthaburi District is planned as a residential and civic center district under the project.

The infrastructure development was a prioritized agenda in the national development plans both at appraisal and at post evaluation. The project is also in accordance with the policies and strategies of the National Regional Plan, prepared by Department of Public Works and Department of Town and Country Planning of Ministry of Interior, at the time of post evaluation.

3.1.2 Relevance with the Development Needs of Thailand

At the time of appraisal (1997), as Bangkok was developing and expanding, the population of Nonthaburi District in the Northern Bangkok area had been increasing rapidly. Particularly, the west bank area of Chao Phraya River in the northern area was developing, and neighboring areas were also expected to develop as residential areas. With the increase of population, high traffic demand was projected in the west bank area. However, the number of crossing bridges in

the northern area was fewer than that in the central area, and the traffic flow for the east-west direction was disrupted / constrained. The road network was not well developed, with the Bangkok Outer Ring Road as the only road serving the north-south traffic in the west bank area of the northern district. The project objectives to alleviate the traffic congestion and enhance the road network development in the subject district are in accordance with the country's development needs.

The east-west road, including Pak Kret Bridge constructed under the project, is an important link to connect the developing Nonthaburi District with the east bank area of the Chao Phraya River. The north-south road is serving as the link to the road network in the west bank of Chao Phraya River, which also supplements the parallel Bangkok Outer Ring Road. Work extension of the east-west road to the west and of the north-south road to the north is currently being implemented to connect these roads with the Outer Ring Road. Importance of these roads is well recognized, and the need for the project is highly relevant in terms of development of major road network in Bangkok.

Both the east-west and north-west arterial roads, which were constructed in project area of Nonthaburi District, are important links to form the arterial road network in Bangkok, and the need for road development was/is high both at appraisal and at post evaluation.

3.1.3 Relevance with Japan's ODA Policy

The previous Official Development Assistance (ODA, 1992) Charter stated the close relationship between Japan and the East Asian region (including ASEAN) and has put priority on Asian region. The infrastructure improvement was listed as one of its priority issues. Since the subject project was prepared before the Country Assistance Programs were introduced in 1998, a Country Assistance Program focusing on Thailand is not available. ,

This project has been highly relevant with the country's development plan and needs, as well as Japan's ODA policy. Therefore, its relevance is high.

3.2 Efficiency (Rating: b)

3.2.1 Project Outputs

The actual project length of both the east-west and north-south roads is almost as planned (original length of 13.3 km against actual length of 13.8 km). The actual length of each road (east-west and north-south roads) differs from the original plan, because the length of each road section depends on in which contract section the section around the junction connecting both the east-west and north-south roads was included. Interchanges were constructed as planned.

Table 1　Comparison of Outputs (planned and actual)

Component	Planned	Actual
① East-west road	・ Pak Kret bridge (6-lane、206m) ・ East-west road (about 7.7 km from Pak Kret intersection to the North-south road junction) : number of lanes is 6 (except 4-lane viaduct section in the east bank of Chao Phraya River)	Almost as planned ・ Pak Kret bridge (6-lane、278m) ・ East-west road (about 5.8 km from Pak Kret intersection to the North-south road junction) : number of lanes is 6 (except 4-lane viaduct section (about 1.8 km) in the east bank of Chao Phraya River)
② North –south road	・ about 6.1 km from Route 345 – Route 302: number of lanes is 6	Almost as planned ・ about 7.5 km from Route 345 – Route 302: number of lanes is 6
③ Interchanges	・ 3 locations (around Pak Kret intersection (east-west road), a junction connecting the east-west and the north-south roads, and an interchange connecting the north-south road and Route 345 (north-south road)	As planned

Source: Responses to the questionnaire

Main changes of outputs are described below. For safety reasons of the marine transport along the Chao Phraya River, the central span of the Pak Kret Bridge was widened from 94 m to 134 m. Since the west bank area of Chao Phraya River is a soft ground area, settlement was anticipated. Thus, the originally proposed cement concrete pavement was changed to asphalt pavement for easier maintenance after project completion.

Regarding consulting services, a local consultant was employed during July 2002 – January 2007 to assist in the bidding process and construction supervision. These consulting services were not financed by the ODA loan.

Starting point of the East-West Road
(West bound)

Junction connecting between
East-West and North-South Roads

3.2.2 Project Input

3.2.2.1 Project Period

The project period substantially exceeded the planned period. The planned period at appraisal was from September 1997 (Loan Agreement signing) to September 2001 (project completion), with a total period of 49 months. The actual project period was from September 1997 (Loan Agreement signing) to December 2006 (open to traffic), with a total period of 112 months, which is 229% of the planned period. The delay in project implementation is mainly due to delay in land acquisition activities, which required about four and half years till commencement of selection of contractors. The loan was signed right after the Asian financial crisis, and consequently the Thai government could not allocate the budget for the land acquisition and resettlement activities in time. As a result, the land acquisition and resettlement activities could not commence as planned and negotiation with land owners on the amount for compensation also took longer.

The planned schedule for selection of contractors to completion of civil works was from January 1998 to September 2001 with a total length of 45 months, while the actual period was from July 2002 to December 2006 with a total length of 54 months, exceeding the plan by 20% in terms of number of months. The delay in project implementation after commencement is due to extension of the project period to allow for the widening of the Pak Kret Bridge from 94 m to 134 m.

3.2.2.2 Project Cost

The total project cost estimated at appraisal was 18.636 billion yen (of which the Japanese ODA loan amount was 6,807 million yen and the rest was to be locally funded), and the actual total project cost was 11,808 million yen (of which the Japanese ODA loan amount was 4,960 million yen and the rest was to be locally funded), which is lower than planned (63% of the planned amount). However based on local currency, the total project cost slightly exceeded the planned amount (108% of the planned amount). The increase of project costs are mainly because of: ①change of structures at a bridge approach section and substructures of the viaduct section at the east bank of Pak Kret Bridge; ②additional works for relocation and construction of ducts with manholes for telephone cables; ③enlargement of a central span of Pak Kret Bridge due to safety reasons for navigation; and ④countermeasure works in the soft ground areas in the Chao Phraya River west bank area. The reduced project costs in Japanese yen are due to drop of the foreign exchange rate (1 baht=4.75 yen at appraisal to 2.80 baht at post evaluation).

Although the project cost was lower than planned, the project period was significantly longer than planned, and therefore efficiency of the project is considered moderate.

3.3 Effectiveness (Rating : a)

3.3.1 Quantitative Impacts

3.3.1.1 Results from Operation and Effect Indicators

(1) Passing traffic volume

The passing traffic volume on roads improved/constructed under the project is shown in Table 2.

Table 2 Passing Traffic Volume

(Unit: passenger car unit/day)

	2007	2008	2009	2010
East-West Road	28,500 (48,000)	n/a	n/a	81,000 (53,000)
North-South Road	77,500 (54,000)	n/a	n/a	105,500 (61,000)

Source: Counted numbers by DRR Maintenance Bureau

Note 1: Numbers in ( ) are projected figures in the F/S report (1994)

Note 2: Counted traffic volume on the North-South Road, funded by the project is not available. Volume shown in the table is the one counted at the location 2 km south of the project ending point.

No bureau/division of DRR has regularly undertaken traffic count at fixed stations. Counted data for 2007 and 2010 were actually available. There was no data available on traffic volume for the North-South Road section covered under the project, the data counted at the location 2 km south of the project ending point was used for analysis. In about three and half years (March 2010) after the project completion, the traffic volume on both East-West and North-South roads substantially exceeded the projected volume. The current volume in East-West Road is approaching the basic design capacity for 6-lane highway (88,000 vehicles per day). The current traffic volume in the North-South Road has exceeded the capacity, and traffic congestion occurs during the peak hours. The reason why the traffic volume on the East-West Road has tremendously increased for the past three years (2.8 times higher than that in 2007) could be that a huge government complex (the total number of in-out persons is about 50,000 per day) was completed about 3 km east of the Chao Phraya River along Chaengwattana Road in 2007.

The reason for higher traffic volume on North-South Road is that after the project completion, the area rapidly became more residential and commercial, along with the construction of numerous restaurants and shops along the corridor.

Interchange connecting between North-South Road and Route 345

North-South Road

(2) Reduction of travel time

Since data on travel time between two specific locations before the project is not available, the current required time to travel between two selected locations was surveyed on two different routes and results were compared under this post evaluation. The two selected locations are the interchange connecting between East-West Road and North-South Road in the west bank area of Chao Phraya River, and the 1.5 km east along Chaengwattana Road in the east bank area.

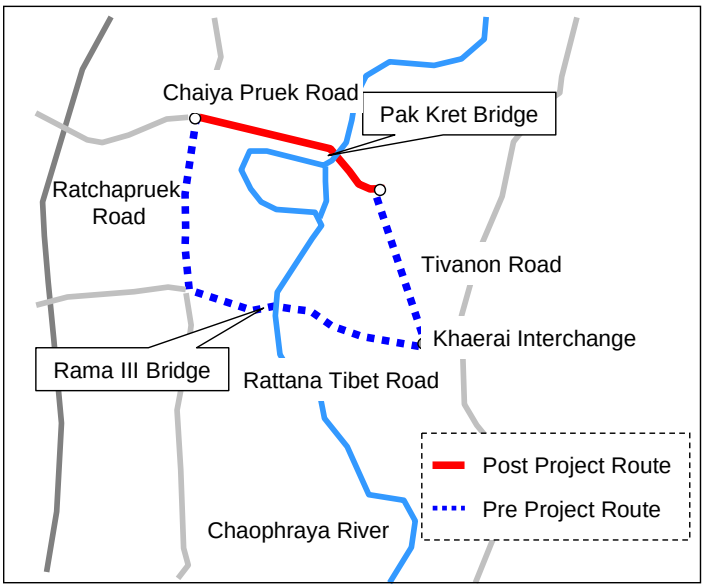

Figure 2 Specific Two Locations on both sides of Chao Phraya River

Table 3 Required Times to Travel the Specific Segment along the East West Road Corridor before and after the Project

	Segment (Route)	Length (km)	Required time (minutes)
Before the Project	Tivanon Road, Rattana Tibet Road, Rama III Bridge, Ratchapruek Road	19.6	Average 37 min. (47 min., 28 min.)
After the Project	Chaiya Pruek Road (East-West Road under the project)	6.5	Average 5 min. (5 min, 5 min)

Source: Actual figures surveyed by the evaluation team during 6 AM – 7AM on May 14, 2010
Note: Required time for round trip was surveyed by two teams who traveled firstly in the clockwise and counterclockwise directions and time for each route was averaged.

The required time to travel between the two specific locations after the project completion was reduced by about 30 minutes compared to that before the project. Reduction of travel time could be due to shorter travel distance and reduction of traffic congestion level. However, the results are only for reference since the current road/transport and social- economic conditions are quite different from those in 1997, when the project was prepared. Meanwhile, the result of the beneficiary survey showed that travel time of road users was reduced by 30 minutes in average after the project was completed.

(3) Stimulation of land use

Stimulation of land use in the project subject area was expected under the project. The land price (government declared value) of the project area before/after the project was investigated.

Table 4 Change of Land Price in the Project Area

(unit: baht/4m^2)[3]

Subject Area	Government declared price for 2004-2007 (before project)	Government declared price for 2008-2011 (after project)
East-West Road (Chao Phraya River East Bank Area)	30,000 – 96,000 (63,000)	96,000
North-South Road (Chao Phraya River West Bank Area)	10,000	40,000

Source: Treasury Department, Ministry of Finance

Comparison of land prices (government declared price) in the project area before/after the project indicate that price increased by 1.5 times in the Chao Phraya east bank area along East-West Road, and by 4 times in the Chao Phraya west bank area along North-South Road. In addition, the area became more residential and commercial, and land price rose.

[3] Thai specific unit indicating the government declared land price.

Rate of increase in population in the project area (Pak Kret district) at the project commencement (2003) was 2,000 persons per year. However, in 2008 upon completion of the project, population increased by 5,000 persons per year, which indicates that the area has been more residential. The amount of migration in the project area (Pak Kret district) is shown in the following table.

Table 5 Amount of Migration in the Project Area (Pak Kret district)

(unit: persons)

	Migration	Out-migration	Increase
Year 2003 (Project commencement)	17,300	15,300	2,000
Year 2008	20,500	15,500	5,000

Source: Public Administration Dept., Ministry of Interior

3.3.1.2 Results of Calculations of Internal Rate of Return (IRR)

The Economic Internal Rate of Return (EIRR) at appraisal was estimated at 23.8%, with the assumptions that construction costs, consulting services fees and maintenance costs are considered “cost”; savings of vehicle operating costs and travel time saving costs are considered “benefit”; and project life is twenty years. In order to calculate EIRR at post evaluation, the following assumptions were made. Costs are actual construction costs, consulting services fees (actual), and maintenance costs increased by the project (based on the projected costs made by DRR, costs required for the 20-year project life period, used at appraisal were re-estimated). Quantitative benefits are savings of vehicle operating costs and travel time savings (based on the projected benefits made by DRR, benefits to accrue for the 20-year project life period, used at appraisal were re-estimated). It was estimated at 30.0%. The reason for higher EIRR than originally estimated is that the actual traffic volume is higher than projected, and the traffic volume during the remaining period of the project life is much higher than projected since the project completion was delayed by 5 years against the original schedule.

Table 6 Economic Internal Rate of Return (EIRR)

	EIRR
At appraisal	23.8%
At post evaluation	30.0%

Source: Calculated based on responses to the Questionnaire

3.3.2 Qualitative Effects

Beneficiary surveys, through interviews, were conducted in the project area. The number of respondents was 160 persons. Responses were collected from road users (80 drivers and passengers), and/or local residents/workers (80 persons), and/or all respondents depending on the contents of questions. The classification of respondents by sex was 45% female and 55% male.

Sixty-eight (68) percent of respondents perceive that the traffic congestion in the project area has improved, and 79% of road users responded that the travel/commuting time has been substantially reduced. Sixty-five (65) percent of drivers/road users perceive that the transport cost has been reduced, and particularly because of substantial reduction in fuel costs (92%) and other maintenance costs (17%). Therefore, it is considered that the project has contributed to alleviation of traffic congestion.

East West Road, including Pak Kret Bridge, is a major link connecting between the Nonthaburi district and the Chao Phraya River east bank area, while the North South Road is the link leading to the central Bangkok supplementing the parallel Outer Ring Road. Both arterial roads constructed under the project contributed to the enhancement of the Bangkok road network.

Results of beneficiary surveys indicate that the project's objectives were achieved based on alleviation of traffic congestion, and enhancement of road network. Only 40% of local residents and workers perceive that the project contributed to stimulation of land use in the project subject area. The reason for less positive response could be that the project road provided more benefits to the passing road users rather than to local residents.

This project has largely achieved its objectives, and therefore its effectiveness is considered high.

3.4 Impact

3.4.1 Intended Impacts

Population of Metropolitan Bangkok as of 2008 is about 5.71 million and that of Nonthaburi district, which is the subject project area is about 1.05 million.

Forty-nine (49) percent among all the respondents (160 persons) perceive that the project has contributed to the regional economy, while 18% has no impact, and 16% has negative impact. The people who perceive without or negative impact considers the current economic depression/unstable political situation at the national level as more dominant.

Forty-nine (49) percent of local residents/workers (80 persons) perceive that there was no major change in the household income before and after the project. However, 18% said that the

income has increased, while 25% said that income has decreased. The reason income has not changed or has decreased is because the project site is located in the residential area rather than in the business/industrial district. In addition, local residents seemed to be suffering more from the current economic depression.

Thirty-eight (38) percent of local residents/workers perceive that the land in the region has been more effectively used. However, 28% say that there has been no change, and 14% say that stimulation of land use has worsened. The reason provided by people who perceive either no change or worst is that the subject roads provided more benefits to passing road users rather than local residents. The local residents along the corridor are also not keen by its negative impacts (traffic noise, disruption of local community, increase of traffic rules violating vehicle, congestion on service roads and others).

Regarding the land price, 36% of respondents perceive that it has increased upon completion of the project. Fifty-eight (58) percent of all the respondents recognize that the project contributed to promotion of tourism.

3.4.2 Other Impacts

(1) Impacts on the natural environment

According to the beneficiary surveys, since project roads are ordinary 6-lane highway at ground, except for Pak Kret Bridge and some viaduct sections, thirty-eight (38) percent of local resident and workers complained about the increase in traffic noise due to substantial increase of traffic volume, while 40% said no changes and 14% said that it has improved. Currently, enforcing traffic rules (speed, parking, exhaust sound and other traffic violations) has been implemented. However, stricter enforcement (speeding and exhaust sound) is needed, especially at night.

(2) Land acquisition and resettlement

Regarding land acquisition, at the beginning of the project the Thai government could not timely allocate budget for land acquisition and resettlement activities, and negotiations on the compensation amount with some land owners took longer time. However, the process and procedures were implemented properly. The estimated land area to be acquired at appraisal was 863,000 ㎡, while the actual acquired land area was about 869,000 ㎡, which is almost as planned. Resettlement of 117 households was planed at appraisal, while 120 households were actually resettled, which is almost as planned. The total cost spent for land acquisition and resettlement was 865 million baht (709 million baht for land acquisition and 156 million baht for compensation), about 112% of the plan.

(3) Other impacts

According to the beneficiary surveys, 66% of road users perceive that the road safety has improved. Regarding traffic accidents, 34% said that accidents have been reduced and 53% said no change. Regarding integration of community, 38% of respondents say that it has worsened since the community has been divided and crossing the highway became difficult after the construction of the arterial highway. Thus, it is evident that efforts to address environmental issues and consideration to the community were not sufficient.

3.5 Sustainability (Rating: a)

3.5.1 Structural Aspects of Operation and Maintenance

The Rehabilitation and Maintenance Division (staffed with 649 persons) of Public Works Department, Ministry of Interior (PWD) was originally to be responsible for maintenance upon completion of the project. However, in October 2002 the central government was reorganized and the responsibility for this project was transferred to Department of Rural Roads (DRR), Ministry of Transport.

Main Entrance of DRR

DRR consists of 11 Bureaus and the Regional Bureau (has 18 District Offices). The number of regular and non-regular staff as of 2008 is about 5,700. In principle, Bureau of Maintenance is responsible for maintenance work after a project was completed and the number of staff assigned to the Bureau is about 200. Maintenance Bureau has 10 maintenance offices throughout the nation and No. 1 Maintenance Office is responsible for the road sections constructed under the project. No. 1 Maintenance Office is staffed with one senior engineer, one civil engineer, one electrical engineer, and 70 workers. It is considered that the organizational setup for maintenance of the completed project is appropriate.

3.5.2 Technical Aspects of Operation and Maintenance

The number of professional staff of DRR is about 1,700. Bureau of Training and Participation is responsible for staff training, and training is provided by senior engineers from each Bureau and Division and in-house consultants. Training subjects are prepared for each stage of project implementation, including design, construction, and maintenance/operation. Training for maintenance and operation focuses on process and procedures for maintenance of ordinary rural roads.

Although there are no comprehensive technical standards guidelines and manuals

documented on maintenance techniques and procedures have been prepared, maintenance of pavement was undertaken referring to various manuals of American Association of State Highway and Transportation Official. The technical level of the executing agency in charge of operation and maintenance is considered appropriate.

3.5.3 Financial Aspects of Operation and Maintenance

The annual budget of DRR for the past four years is shown in Table 7.

Table 7 Budget of DRR by Year

(unit: million baht)

Item	2006	2007	2008	2009
New construction/ improvement	13,694	9,624	8,705	13,088
Operation/maintenance	5,180 (24%)	5,752 (32%)	6,436 (37%)	6,853 (31%)
Others (including capacity building)	2,569	2,482	2,163	2,429
Total	21,442	17,859	17,304	22,370

Source: Draft SAPROF Final Report for the Chao Phraya River Crossing Bridge at Nonthaburi 1 Road Construction Project, November 2009

Note 1: Fiscal year starts in October and ends in September (FY2009: October 2008 – September 2009)

Note 2: Numbers in ( ) are share of operation/maintenance budget among the total DRR budget

The share of budget for operation and maintenance versus the DRR total budget for the past three years is more than 30%, which is considered appropriate. However, according to persons in charge, the budget for maintenance is not sufficient to procure heavy equipment, and the Maintenance Bureau currently has only 5 types of equipment with six units in total, which is considered insufficient. However, roads constructed under the project are essential links in the Metropolitan Bangkok road network, thus priority is given to these roads within the limited budget sources. Budget is allocated as needed; there is no criteria for budget allocation, such as cost per kilometer or by type of pavement. Some sections along North –South Road have been rehabilitated after it was observed during field inspection that the pavement has deteriorated due to settlement.

3.5.4 Current Status of Operation and Maintenance

Regular maintenance work (daily inspection, routine maintenance, periodic maintenance for minor repair and major rehabilitation) have been carried out according to the simple maintenance and management work manuals of DRR. Daily inspection is carried out during the day and night on weekdays and only during the day time weekends. Condition of the pavement

surface and traffic management facilities is visually inspected and monitored. Daily routine maintenance includes minor repairs, such as filling pot holes, cleaning pavement surfaces, and inspection/cleaning of lighting facilities, as needed. Periodic maintenance includes repainting of markings (in principle, every other year), overlay every four years, and change of expansion joints of bridges every five years. However, due to budget constraints, maintenance work has been implemented based on priority schedule from daily inspection results and the amount of traffic volume. Major rehabilitation is implemented depending on the degree of deterioration of road and bridge structures. Major repair works, more than periodic maintenance have been entrusted to two private companies since 1997 on an annual basis.

Until now since project completion, no major repairs have been implemented, except for repairs of pavement surface in some road sections, the road surface has been well maintained. No cracks and pot holes were found on the bridge surface and viaduct sections, and thus it is considered that maintenance has been properly carried out.

No major problems have been observed in the operation and maintenance system, therefore sustainability of this project is high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project has been highly relevant with development policies and needs of Bangkok, Thailand, as well as Japanese aid policies. The project cost was within the planned cost, but the project period exceeded the plan substantially. Therefore, the evaluation for efficiency is considered moderate. The project has largely achieved its objectives, and its effectiveness is highly satisfactory. No major problem has been observed in the capacity of the executing agency nor its operation and maintenance system. Therefore, sustainability of this project is considered high.

In light of the above, this project is evaluated to be highly satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

1. As previously recommended (under the post evaluation (2006) for the related ODA project, Wat Nakorn-In Bridge and Connecting Road Construction Project (1)(2)), it is essential to immediately start conducting regular traffic counts (i.e., same location and same time of the year). Data on traffic volume is essential in planning and programming the maintenance and management work and for preparation of future road development plans. Maintenance Bureau of DRR could be an appropriate unit responsible for collecting data on traffic count, and analyzing and storing the data.

2. Through beneficiary surveys, it was noted that the project roads provide more benefits to the passing road users than local residents and the negative impacts (including noise, disruption of community, increase of traffic rules violating vehicle, congestion on service roads and others) are worse for local residents along the corridor. In order to improve the current living and social environment issues, measures such as enforcing traffic rules (speed, parking, exhaust sound and other traffic violations), installation of additional signs, landscaping and planting along the corridor, and installation of over-bridges, could be implemented immediately.

4.3 Lessons Learned

1. It seems that detailed studies were carried out in planning the main carriageway of the project. However, more attention should have been given to other items and issues such as: 1) disruption to community due to construction of an arterial road (crossing a road became harder and the travel distance to the crossing points became longer), and 2) construction of a viaduct and narrower service roads, which resulted in traffic congestion on service roads. More studies on the issues of disruption to community and traffic management on service roads should be carried out at the project preparation stage. Issues/items to be addressed include: installation of crossing structures (over bridges and culvert boxes) with a proper interval, traffic signs to ensure the smooth traffic flow, paint markings on pavement, and enhancement of law enforcement.

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
① Outputs		
1) East-west road	・ Pak Kret bridge (6-lane、206m) ・ East-west road (about 7.7 km from Pak Kret intersection to the North-south road junction) : number of lanes is 6 (except 4-lane viaduct section in the east bank of Chao Phraya River)	Almost as planned ・ Pak Kret bridge (6-lane、278m) ・ East-west road (about 5.8 km from Pak Kret intersection to the North-south road junction) : number of lanes is 6 (except 4-lane viaduct section (about 1.8 km) in the east bank of Chao Phraya River)
2) North-south road	・ about 6.1 km from Route 345 – Route 302: number of lanes is 6	Almost as planned ・ about 7.5 km from Route 345 – Route 302: number of lanes is 6
3) Interchanges	・ 3 locations (around Pak Kret intersection (east-west road), a junction connecting the east-west and the north-south roads, and an interchange connecting the north-south road and Route 345 (north-south road)	As planned
② Project Period	September 1997 – September 2001 (49 months)	September 1997 – December 2006 (112 months)
③ Project Cost		
Amount paid in foreign currency	6,807 million yen	4,960 million yen
Amount paid in local currency	11,829 million yen (2,490 million baht)	6,848 million yen (2,446 million baht)
Total	18,636 million yen	11,808 million yen
Japanese ODA loan portion	6,807 million yen	4,960 million yen
Exchange rate	1 baht＝4.75 yen (as of January 1997)	1 baht＝2.80 yen (March 24, 2003, fixed during the contract period at the rate set 28 days before the bid submission date)

Second Opinion Report on

Pak Kret Bridge and Connecting Road Construction Project, Thailand

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Given the scarcity of traffic data in Thailand up to now, it is fair to obtain the subjective opinion from beneficiary surveys of road users and local residents/workers to provide recommendations on improving the living and social environment for the sake of the local communities. The proportion of respondents who are road users and those who are local residents/workers as well as the composition of the sex of the respondents are also appropriate. For future projects, however, it is expected that numerical data on traffic congestion and road accidents before the project start and after the project completion would be readily available from government and other sources through satellite imaging and computerized data collection techniques. Therefore such objective data should be used in the future if they are available. Opinions of local community leaders could also be sought to confirm the recommendations.

The relevance of the project with the development needs of Thailand cannot be overstated. The project location in the Nonthaburi area, especially on the west bank of Chao Phraya River, is one of the fastest growing areas in Bangkok and its vicinities in terms of housing and commercial development. It would seem that apart from road networks, more mass transit and public transportation projects would soon be needed to meet the rapid increase in transportation demand in the area.