

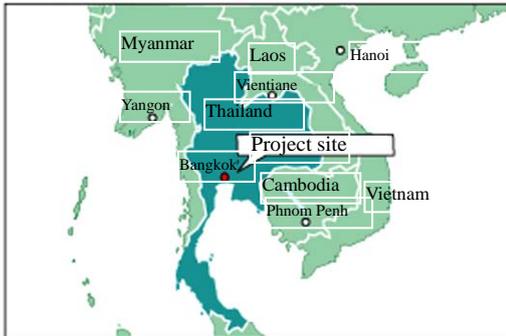
Thailand

Ex-post Monitoring for ODA Loan Project Metropolitan Highway Construction Project – Ramintra~Artnarong Line (I) & (II)

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Field survey: May 2008

1. Outline of the project and Japan's ODA Loan



Location of the project



Highway constructed under this project
(Ramintra~Artnarong Line)

1.1 Purpose of the project

The purpose of this project was to cope with the issue of traffic volume which has been growing proportionately with a soaring population in the area by constructing a new highway will expand the north-south highway network to the northeastern region of the Special District of Bangkok, thereby contributing to alleviating traffic jams in the north-south direction.

1.2 Outline of the loan agreement

Category	Phase I	Phase II
Loan Amount/Disbursed Amount	14,804 million yen/ 10,493 million yen	21,850 million yen/ 15,388 million yen
Date of loan agreement	September 1991/	January 1993/
Final disbursement date	January 1998	May 2007
Ex-post evaluation	Fiscal 2002	
Executing agency	Expressway and Rapid Transit Authority of Thailand: ETA (The name was changed to Expressway Authority of Thailand: EXAT in 2008.)	
Main Contractors	Krung Thon Engineers Co., Ltd. (Thailand) • See Sang	

	Karn Yotah (1979) Co., Ltd. (Thailand) • Vichitbhan Construction Co., Ltd. (Thailand) (JV) /Vianini Lavori S.P.A.(Italy)/Nawarat Patanakarn Public Company Limited (Thailand) /Vianini Thai Construction and Development Co, Ltd. (Thailand) (JV) / Tokyu Construction (Japan) / CH. Karnchang - Tokyu Construction Co., Ltd.(Thailand)/CH. Karnchang Public Company Limited (Thailand) (JV) / Bhrom Vivat Co. Ltd. (Thailand) / Metropolitan Concrete Products Co., Ltd. (Thailand) (JV) / Kampangphetviwat Construction Co., Ltd. (Thailand) / Italian-Thai Development Public Company Limited (Thailand)
Consulting Services	Episilon Co., Ltd. (Thailand) Southeast Asia Technology Co., Ltd. (Thailand), Thai Engineering Consultants Co., Ltd. (Thailand), Pacific Consultants International (Japan) (JV)

1.3 Background and reasons for conducting ex-post monitoring study

Ex-post evaluation was carried out on this project in fiscal 2002. Its overall relevance was evaluated as moderate. As a whole, the level of evaluation was not necessarily to our satisfaction. To put it more specifically, as for its effectiveness, actual traffic volume was considerably below the expected level. At the same time, the manifestations of its impact were limited. Concerning its sustainability, the evaluation report pointed out the inadequacy of personnel and financial weaknesses. Therefore, it was necessary to reexamine the extent to which, in particular, the effectiveness and sustainability of the project have been improved. As a result, ex-post monitoring study of this project was conducted. In this report we outline our field study, review its results per item, and draw conclusions.

At the time of ex-post evaluation, it was recommended that “measures should be taken to formulate efficiently highway plans for the future and prevent the aggravation of unnecessary competition with the existing roads by fully using the functions of OCMLT¹ established by the Ministry of Transport in 1992.” EXAT is an executing agency, while the Office of Transport and Traffic Policy and Planning (OPT) is an organization for policy formulation and designing. It has been confirmed that these two organizations are in cooperative relationship in terms of

¹ OCMLT, Office of the Commission for the Management of Land Traffic, was renamed as the Office of Transport and Traffic Policy and Planning (OTP).

project planning.

2. Findings of the monitoring

2.1 Effectiveness (Effect)

Traffic volume has been on an upward trend although it has not yet reached the originally planned target. However, the highway contributes as a measure to meet an increasing traffic demand in the northeastern area albeit still limited. It is expected that the use of the highway constructed under this project will grow when the eastern outer ring road, which will be completed during 2009, is connected to this highway.

An annual growth rate of population in the project target area was 0.87% on the average during the four years from 2002 to 2007. It exceeds a growth rate of 0.70% in the Bangkok metropolitan area. Thus, the number of residents in this area continues to account for 40% of the total metropolitan population. During the same period the mean increase rate was 10.59% in the number of registered vehicles in the metropolitan area. Traffic demand thus has been boosted. (Refer to Tables 1 and 2 below.)

Table 1 Populations of the project target area (19 administrative districts)

(In persons)

District	2001 (at the time of ex-post evaluation)	2002	2005	2006	2007
Total number of the project target area (A)	2,321,533	2,352,031	2,359,741	2,375,557	2,388,392
Increase rate (%)	1.31	1.31	0.47	0.67	0.54
Total number of the metropolitan area (B)	5,726,203	5,782,159	5,658,953	5,695,956	5,716,248
Increase rate (%)	0.81	0.98	0.44	0.65	0.36
(A)/(B) × 100	40.54	40.68	41.70	41.71	41.78

Source; Bureau of Registration Administration, Department of Provincial Administration, Ministry of Interior

Note: Administrative districts were changed in the project target area in 2004.

Table 2: The number of registered vehicles

(In vehicle)

The number of registered vehicles	2001 (At the time of ex-post evaluation)	2002	2005	2006	2007
Bangkok metropolitan area	4,464,158	5,399,153	4,899,969	5,557,111	5,715,078
Increase rate (%)	-0.72	20.94	14.26	13.41	2.84
The number of newly registered vehicles	299,433	423,284	733,884	-	684,366

Source: The Department of Land Transport, Ministry of Transport

As Table 3 indicates below, daily traffic volume has been steadily rising on the average on the highway constructed under this project (Ramintra ~ Artnarong Line) in proportion with the increasing traffic demand after the ex-post evaluation. It was estimated at 142,669 vehicles per day for 2003, whereas the actual number was 65,058 vehicles per day, and the degree of achievement was 45.60%. For 2007 it was estimated at 172,158, whereas the actual number was 102,170 vehicles per day. The degree of achievement was 59.35%. At the same time, the volume to capacity ratio (V/C) of the highway under this project has increased from 0.31 in 2003 to 0.49 in 2007. Thus, overall conditions have considerably improved since the time of ex-post evaluation, and its traffic volume has been coming closer to the initial goal.²

It is inferred that a free bypass (BMA bypass) that runs in parallel with this highway constructed by the Bangkok Metropolitan Administration (BMA) has stunted the growth of the traffic volume on this highway. The traffic volume of 2007 hovers substantially lower than the number (164,016 vehicles) measured at the time of ex-post evaluation. Some persons concerned made a remark that the traffic volume of the BMA bypass had shown no marked fluctuations through these years. Hence, we asked BMA to disclose information on the traffic volume and received data indicating that the number for 2001 was 58,644 vehicles at the same point measured in 2007. We compared the present traffic volume with the volume at the time of ex-post evaluation by using the number and concluded that the traffic volume had remained almost on the same level.

² There are a weight limit on vehicles on highways in general and a weight limit on trucks in the city of Bangkok. It is assumed that these regulations affect the use of this highway by goods-transport vehicles.

Table 3: Daily average of traffic volume on Ramintra~Artnarong Line and BMA bypass

(In the number of vehicles)

		2001 (at the time of evaluation)	2002	2005	2006	2007
Ramintra ~Artnarong Line	Plan	129,877	136,123	156,722	164,259	172,158
	Actual	48,820	56,480	80,124	90.856	102,170
	Ratio-to-pl an (%)	37.59	41.19	51.12	55.31	59.35
	V/C			0.38	0.43	0.49
BMA bypass	Actual	164,016※ (In 12 h ours)				62,901 (In 12 hou rs)

※ The figure was revised to “58,644” by BMA in this survey.

Source: EXAT and BMA

One factor contributing to the increased traffic volume on this highway may be that the toll has remained the same in addition to the growth of traffic volume itself. In this survey we compared the driving time required on the highway with the time on the bypass. The result demonstrates that the driving time can be shortened by about 14 minutes during peak hours and about four minutes during off-peak hours (an average figure of both directions). Thus, we see an effect that is no less satisfactory than that measured at the time of ex-post evaluation in shortening the driving time. Throughout this period, the toll has remained the same, that is, 30 baht (approximately ¥96 at the present conversion rate). As a result of the inflationary tendency in the last few years, the toll which highway users are willing to pay in order to reduce their driving time is more than 30 baht. It is presumed that they have shifted from the BMA bypass to this highway. (The toll has been changed neither for this highway nor for other competitive highways since the time of ex-post evaluation.)

The ex-post evaluation report made a mention of the “Ramintra~Artnarong Line” (See Figure 1) (which is an expressway to connect the highway constructed under this project to the eastern outer ring road).” The construction of this expressway has been progressing smoothly and will be completed in 2009. With its opening, the traffic volume of the highway constructed under this project will further expand. In this connection, the feasibility study carried out in 1998 projected that its traffic volume after the opening of the expressway will show an increase of 29,600 vehicles per day. EXAT is exploring the possibility of raising the toll for the highway constructed under this project by 10 baht.

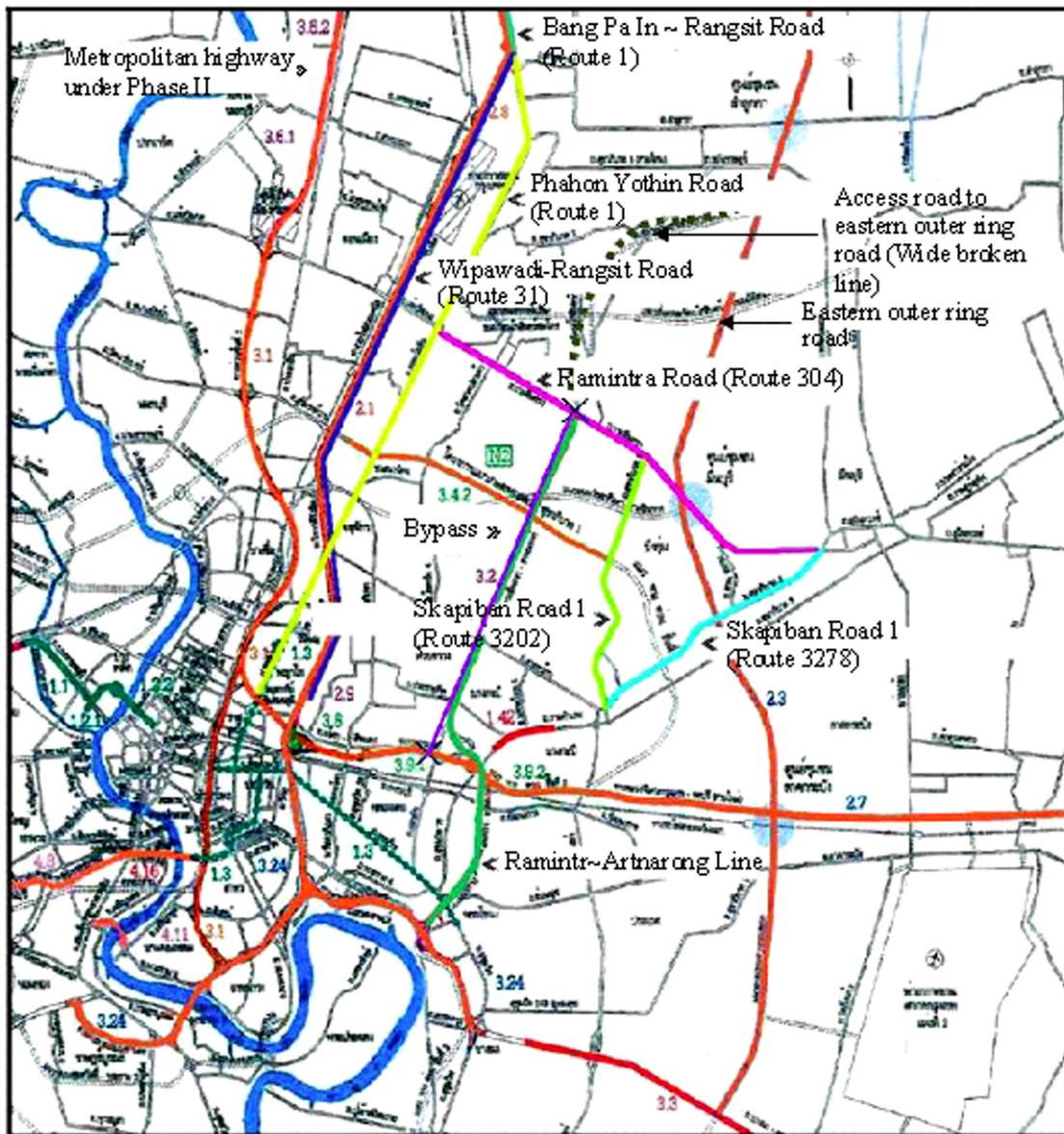
2.2 Impact

In the ex-post evaluation and this ex-post monitoring, the following seven routes were analyzed to understand the traffic congestions of north-south direction in the Bangkok metropolitan area.

- ① Road No. 1 (Bang Pa In ~ Rangsit: Bang Pa In ~ Rangsit Road)
- ② Road No. 1 (Bangsit ~ Bangkok: Phahon Yothin Road)
- ③ Road No. 31 (Rangsit ~ Viphavadi – Wipawadi-Rangsit Road)
- ④ Line No. 304 (Ramintra Road)
- ⑤ Line 3202 (Ramindra ~ Lad Phrao – Skapiban 1 Road)
- ⑥ Line No. 3278 (Minburi ~ Lad Phrao – Skapiban 2 Road)
- ⑦ Metropolitan highway under Phase II

The following map shows the above seven lines and the road under the project (Ramintra~Artnarong Line) and BMA bypass.

Figure 1: Road map of major roads in the Bangkok metropolitan area



Note: The BMA bypass nearly overlaps with the northern half of the Ramindr~Artnarong Line as it is shown with X marked from its starting point to the end point.

As shown in Table 4, the trends of traffic volume are varied with each road after the time of ex-post evaluation. First, an annual average of traffic volume per day has been on the decline on each major road (①, ② and ③). The traffic volume of the ① Bang Pa In ~ Rangsit Line was 293,637 vehicles per day in 2001, whereas it was 205,147 vehicles per day in 2007. The traffic volume of the Phahon Yothin Road also showed a decrease, that is, from 81,911 vehicles per day in 2001 to 52,834 vehicles per day in 2007. The traffic volume of ③ Route 31 also has been declining from 2001 to 2007 just as ① and ② (although to a varying degree in each year).

Table 4: Change in the traffic volume of main roads (7 routes)

(Vehicles per day)

Trunk road		2001 (at the time of ex-post evaluation)	2003	2004	2005	2006	2007
①	No. of vehicles	293,637	157,585	157,961	172,062	176,981	205,147
②	No. of vehicles	81,911	68,976	58,865	54,356	51,050	52,834
③	No. of vehicles	242,486	245,518	211,082	173,551	296,483	194,354
④	No. of vehicles	102,799	105,974	96,834	86,386	88,126	105,473
⑤	No. of vehicles	75,279	71,592	73,860	58,034	—	—
⑥	No. of vehicles	31,773	40,627	n/a	39,475	38,669	—
⑦	No. of vehicles	220,169	259,753	266,189	271,676	270,935	286,172
	V/C		0.87	0.89	0.91	0.90	0.95

Source: DOH,BMA (Routes 5 & 6) and EXAT (Route 7)

As for the yearly average of daily traffic volume of trunk roads (④, ⑤ and ⑥) in the neighboring districts of the project area, it has shown no marked fluctuations on ④ Route 304. It has been on the decrease on ⑤ Route 3202 (as of 2005), and has been slightly increasing on ⑥ Route 3278. The traffic volume is on an upward trend on ⑦ Phase II Metropolitan Highway.

In 2001 the traffic volume of the highway constructed under this project accounted for 4.2% of the total traffic volume on all the above lines from ① to ⑦ and the project highway/BMA bypass. However, in 2007 the proportion increased to about 9%. (Some figures for 2007 are taken from the data for 2005.) In particular, the traffic volume has shrunken on ② and ⑤ which are obviously in competition with the highway constructed under the project. Thus, in all likelihood this demonstrates that traffic jams have been alleviated.

A small scale survey was carried out for 20 drivers at the service station near the north exit of the highway built under this project concerning their route selection when they go to the heart of Bangkok. Its findings revealed that the project highway was preferred to the competitive roads in the neighborhood when they went to the central Bangkok. The greatest reason was that they could reach their destinations quicker. At the same time, seven out of the twenty drivers responded that the frequency of using the highway increased during the past three years (Out of 20 drivers, 10 said “no change” and 3 said “decreased”). Based on the above data and the findings of this survey, there is a high possibility that traffic flow has been shifting to this highway from roads connected to routes ② and ⑤. Putting all the data together, it can be assumed that this project contributed to a certain degree to alleviating traffic congestions of the trunk roads in the Bangkok metropolitan area.

(Impact on society and environment)

There have been no new noticeable changes in the status of land acquisition and resettlement that was confirmed in the ex-post evaluation. We obtained measurements on noise, vibration and air pollution at the same five points of monitoring used at the time of ex-post evaluation. As shown in Tables 5 and 6 below, all the figures are below the standards stipulated by the Pollution Control Department of the Ministry of Natural Resources and Environment, and we observe no particularly negative impacts.

Table 5: Environmental monitoring results of the Ramintra~Artnarong Line
(2001: Results at the time of ex-post evaluation)

Points of monitoring	Noise Leq(24hr)dBA	Vibration (mm/sec)	Air pollution		
			TSP 24hr (mg/m ³)	NO2 1hr (mg/m ³)	SO2 1hr (mg/m ³)
Saunrat School	57.00	0.425-1.72 0	0.083	0.015	0.010
Tararom Village	55.30	0.345-0.46 5	0.054	0.013	0.011
Orchid Villa Village	69.40	0.375-0.90 0	0.074	0.023	0.009
Khrong Song Kathiam School	63.50	0.275-0.42 5	0.076	0.019	0.009
Soi Yu Yen	62.20	0.450-1.55 0	0.088	0.017	0.010
Standard values	70	-	0.330	0.320	0.780

Source: ETA

Table 6: Environmental monitoring results of the Ramintra~Artnarong Line (2007)

Points of monitoring	Noise Leq(24hr)dBA	Vibration (mm/sec) (2005)* ¹	Air pollution		
			TSP 24hr (mg/m ³)	NO2 1hr (mg/m ³)	CO * ³ 1hr (mg/m ³)
Saunrat School	61.1* ²	0.500-0.55 6	-	-	-
Tararom Village	56.7	< 0.500	0.113	0.030	0.90
Orchid Villa Village	58.5	1.430-1.68 0	0.137	0.023	2.40
Khrong Song Kathiam School	64.7	0.667-1.13 0	0.127	0.043	0.50
Soi Yu Yen	64.1	1.250-1.65 0	0.183	0.033	2.73
Standard values	70	-	0.330	0.320	30

Source: EXAT

Notes:

- * 1. The conditions of vibration were remarkably calm. Hence, we did not monitor vibration in 2007.
- * 2. Saunrat School is located away from the project highway by 230m and the impact inflicted by noise is slight. Thus in 2007 the level of noise was not measured, and instead of that, the figure of 2005 was noted.
- * 3. The executing agency believes that CO is more appropriate as a parameter than SO₂, which was thus replaced by CO.

2.3 Sustainability

With respect to technology and organization, we have witnessed improvements in the issues pointed out at the time of ex-post evaluation (insufficient training to technical staff and the shortage of personnel). Financial affairs, which had been in a rather serious chronic state of deficit, turned for the better, thereby clearly improving overall sustainability.

2.3.1 Executing agency

2.3.1.1 Operation and maintenance system

The name of the executing agency, Expressway and Rapid Transit Authority of Thailand (ETA), was changed to the Expressway Authority of Thailand (EXAT) in 2008. The current duties under the control of EXAT include the planning, implementation and operation/maintenance of expressways. As of May 2008, EXAT is constituted of twelve departments and thirty-four divisions with 3,470 persons. The operation and maintenance of the highway built under this project are under the control of the Maintenance Department, Toll Collection Department, Traffic Control Department and the Office of Operation Planning. The number of personnel is sufficient to fulfill necessary responsibilities.

2.3.1.2 Technical capacity for operation and maintenance

At present, 47 engineers and 209 technical staff members are hired by the entire EXAT for the operation and maintenance-related departments and divisions. The operation and maintenance of facilities are performed methodically under the system in which the database of inspection and repair information and various manuals (inspection, maintenance, repair and system use) are combined. The system is based on preventive maintenance. The comments/remarks collected through interviews with people in the executing agency demonstrate that there are no technical problems in the operation and maintenance in particular. As regards the issue pointed out at the time of ex-post evaluation that “neither training for young employees nor training on special operation and maintenance has been held,” the agency has assured us that it provides such training periodically through outside seminars or within the

agency.

2.3.1.3 Financial status

A comparison of the profit and loss statement between the time of ex-post evaluation (2001) and the past three years (2005~7) substantiates the fact that the balance of payments of EXAT greatly improved from the time of ex-post evaluation. Its operating income was boosted to a great extent compared to that of the time of ex-post evaluation. In fact, it was on an upward trend for the past three years. Proportionately with the increases in the operating income, the current account profit changed from 658.5 million baht to 2.16 billion baht and 1.39 billion baht in the past three years, thus evidently improving greatly from the time of ex-post evaluation. In addition to larger revenues from tolls in conjunction with the expanding traffic volume, it is believed that reductions in expenses by power saving and outsourcing services contribute to the improvement of ordinary profit and loss. Financial indicators such as capital adequacy ratio, liquidity ratio and operating profit and loss ratio (ratio to operating income) have been greatly bettered in comparison to those at the time of ex-post evaluation.

The budget execution of EXAT concerning operation and maintenance (including roads not under this project) are shown in the following table.

Table 7: Operation and maintenance cost of EXAT

(In one million baht)

Fiscal year	2003	2004	2005	2006	2007
Budget request	Not known	909.4	1,010.8	1,116.6	1,209.6
Performance	Not known	768.0	953.7	998.2	1,014.7

Source: EXAT

The executing agency avows that the above operation and maintenance costs are at a sufficient level and predicts that this level will be maintained in the future as well.

As for the executing agency, Article 38 of the old Law for the Establishment of ETA stipulated that “the government shall make up for the loss, if any.” The similar provision is included in Article 47 of the revised Law for the Establishment of ETA.

2.3.2 Maintenance Condition

Main constructions under this project include highway, toll plazas and control center. We have detected no physical flaws, and they are operated without problems. The facilities have been still systematically maintained according to the combination of the database of inspection

and repair information and various manuals. A preventive maintenance system is adopted. The highway built under this project is maintained based on the three maintenance programs that require for upkeep at the frequency of every day, six months or one year. In the aspect of management, the toll collection system has been smoothly enforced. As for the measure to assist with troubled vehicles or accidents, an enough number of staff and special vehicles are secured, and there is know-how on how to deal with a case of emergency.

3. Conclusion, lessons learned and recommendations

3.1 Conclusion

As can be seen from the fact that the traffic volume has increased on this highway and traffic congestions have been alleviated, the project's effectiveness has certainly been enhanced. The sustainability has been improving satisfactorily as well.

3.2 Recommendations

“For EXAT, the executing agency”

- It is expected that the opening of an expressway to connect the highway under this project to the eastern outer ring road will further enhance the effectiveness of this project. Hence, it is hoped that its construction will be expedited smoothly.
- The toll of this highway should be revised with extreme care, if it is done so when the above expressway is opened, with due consideration for the issue of price elasticity.

3.3 Lessons learned

“For JBIC and EXAT, the executing agency”

- It can be argued that, as stated above (footnote on page 4), a weight limit on vehicles and a weight limit on trucks on highways in general within the city of Bangkok affect this highway's use by private goods transport vehicles. When industrial promotion is the main objective of road construction in future projects, it will be essential to develop roads in the way in which enterprises will be able to transport their goods without unnecessary difficulties.

Comparison between major plans and performance

Item	Plan	Actual
① Scope of the project		
1 Highway construction		
(1) Phase I		
1) Extension	11.5km	11.934km
2) The number of lanes	6	Same as the plan
3) Section	Ramintra Rd. ~ Rama IX Interchange	Same as the plan
4) Interchange	1 location (Ramintra)	2 locations (Ramintra & Lad Phrao)
5) Slip ramp	4 locations	5 locations (+ Yothin Pattana)
6) Toll plaza	4 locations	5 locations (+ Yothin Pattana)
(2) Phase II		
1) Extension	7.2km	6.865km
2) The number of lanes	6	6
3) Section	Rama IX interchange ~ Artnarong Interchange	Same as the plan
4) Interchange	2 locations (Rama IX & Artnarong)	Same as the plan
5) Slip ramp	3 locations	Same as the plan
6) Toll plaza	4 locations	5 points (+ Pattanakarn 2, + Artnarong 2)
2 Consulting service		
1) Project engineer	385M/M	93M/M
2) Local staff	2,250M/M	4,188M/M
② Project period	Phase I May 1991 ~ Sept. 1995 At the time of appraisal (52 months) Phase II May 1991 ~ June 1996 At the time of appraisal (61 months)	August 1992 – April 2000 (92 months)
③ Project cost		
Foreign currency	Phase I time of appraisal ¥28,973 million Phase II time of appraisal ¥27,524 million	¥24,123,000,000
Local currency	Phase I time of appraisal ¥45,075 million Phase II time of appraisal ¥9,130 million (Local currency: Baht)	¥138,728,000,000** (Local currency: Baht)
Total	Phase I time of appraisal ¥74,048 million* Phase II time of appraisal ¥98,343 million**	¥162,851,000,000**
ODA loan portion	Phase I time of appraisal ¥28,973 million Phase II time of appraisal ¥36,654 million	¥25,881,000,000
Rate	1 baht = ¥5.1	1 baht = ¥5.3

*Does not include BMA expenses for road construction

**It has not been confirmed whether or not BMA expenses for road construction are excluded.