Viet Nam

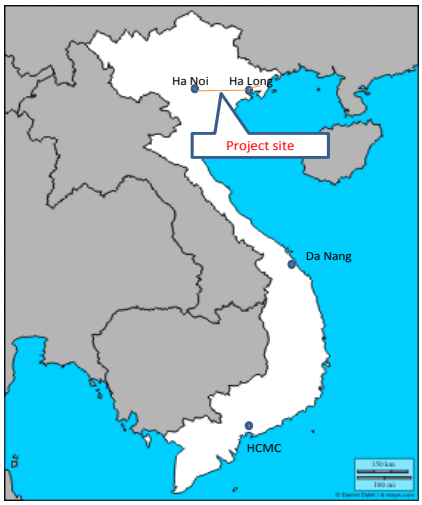
Ex-Post Evaluation of Japanese ODA Loan Project
National Highway No. 18 Improvement Project (I) (II)

External Evaluator: Atsushi Tokura, IC Net Limited

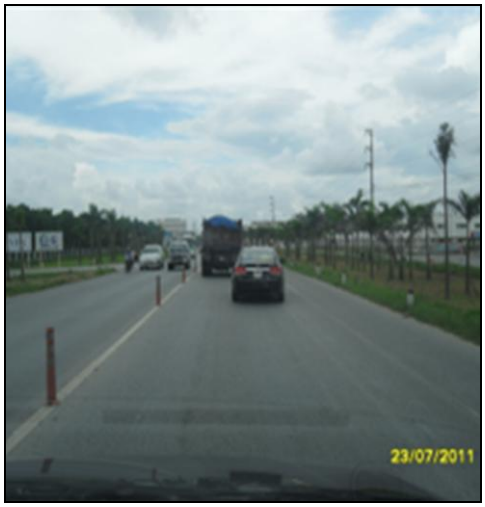
0. Summary

The objective of this project is to promote traffic safety and facilitate efficient logistics and distribution of goods by improving a part of National Highway No. 18, from Noi Bai near the international airport to Cua Ong in Quang Ninh Province (approximately 135 km), which had to be improved urgently. Relevance of the project is high, as the project objective is relevant with Vietnamese development policy and needs and Japan's ODA policy. After the improvement of the highway, traffic amount has increased and various benefits have been realized for the residents along the highway. Some positive impacts have already realized on social and economic development. The efficiency of the project is just fair, as the project period was longer than planned. It is expected that achievement of the project will be sustained, as the project has no problem in terms of organizational and technical aspects, although the project has an issue in terms of financial aspects besides road safety issues. In light of the above, this project is evaluated to be satisfactory.

1. Project Description



Project location



National Highway No. 18

1.1 Background

The road sub-sector was very important in the transportation sector of Viet Nam at the appraisal time. The sub-sector accounted for 70% of all passenger and cargo transport in the country on a weight basis. However, the road network in Viet Nam was damaged by the war and

had not been well maintained due to budget constraints, so that the deterioration of the road network became serious. In the northern part of Viet Nam, most highways were constructed before 1954 and very few roads had been built since then. In the 1990s, deterioration of the road network became more serious, as transport volume had significantly increased due to economic growth.

National Highway No. 18 is approximately 319 km arterial road, crossing the northern region from Noi Bai near the international airport, via Ha Long Bay and the coastal area, to Bac Luan town, which is close to the border with China. The highway is a road for the Hanoi-Hai Phong-Ha Long triangle zone, where the Government has promoted economic growth intensively. Several industrial zones have been developed near Noi Bai international airport and Cai Lan port in Ha Long area, which is the only deep-water port in the northern region, was expanded by Japanese yen loan in 2006. The highway No. 18, along with the highways No. 5 and 10 that were also improved by Japanese yen loan, is an important road to promote the socio-economic development in the northern region. It was necessary to rehabilitate and widen the road, because deterioration of the road and aging of the road surface became serious. In addition, the construction of new bridge was necessary, as cars and passengers had to use a ferry boat to cross a river. Rehabilitation of the existing bridges was also necessary, as some bridges were deteriorated.

1.2 Project Outline

The objective of the project is to facilitate smooth logistics and distribution of goods through the promotion of traffic safety and efficiency, by improving the 133 km of National Highway No. 18, which is a major arterial road in the northern region of Viet Nam, thereby contributing to socio-economic development in the northern region of Viet Nam.

	Phase I	Phase II
Approved Amount / Disbursed Amount	11,863 million yen / 11,644 million yen	11,586 million yen / 9,741 million yen
Exchange of Notes Date / Loan Agreement Signing Date	March 1998 / March 1998	March 2000 / March 2000
Terms and Conditions	Interest Rate: 1.8% p.a. (Goods & Services) 0.75% p.a. (Consulting Services) Repayment Period/Grace Period: 30 years/10 years (Goods & Services), 40 years/10 years (Consulting Services) Conditions for Procurement: Partially Untied	Interest Rate: 1.8% p.a. Repayment Period/Grace Period: 30 years/10 years Conditions for Procurement: General Untied
Borrower / Executing Agency	The Government of the Socialist Republic of Viet Nam / Ministry of Transport, Project Management Unit 2[1],	
Final Disbursement Date	July 2008	

[1] The executing agency was called Project Management Unit 18 at the time of project implementation. It was renamed on July 15, 2008.

Major Contractor (Over 1 billion yen)	【Package 1】Northern Engineering Construction Corporation(Viet Nam)・Song Da Construction Corporation(Viet Nam)・Than Long Construction Corporation(Viet Nam) (JV) 【Package 2】Bach Dang Construction Corporation(Viet Nam)・Samwhan Corporation(Korea) (JV) 【Package 3】China State Construction Engineering Corporation(China)・Transport Material & Construction Company(Viet Nam) (JV) 【Package 4】Trung Son Construction Corporation(Viet Nam)・Lung Lo Construction Corporation(Viet Nam) (JV) 【Package 5】China Shenyang International Economic & Technical Cooperation(China) 【Package 6】Investment and Construction Jsc. Company No4(Viet Nam)/Ha Noi Construction Corporation(Viet Nam) 【Package 1a】CIENCO1(Viet Nam)・ Thang Long Corp(Viet Nam) (JV) 【Package 3a】Construction Company 319(Viet Nam)/ Ministry of Defense(Viet Nam) 【Package 4a】Construction Company 319 (Viet Nam)/ Ministry of Defense(Viet Nam))
Main Consultant (Over 100 million yen)	<National Highway No. 18 Improvement> Pacific Consultants International (Japan)/Oriental Consultants (Japan)/Asia Pacific Engineering Consultants (Viet Nam) <Bai Chay Bridge Engineering Services> Hyder Consulting-CDG LTD (U.K.)/Transport Engineering Design Incorporation (Viet Nam)/Japan Bridge & Structure Institute, Inc. (Japan)/Pacific Consultants International (Japan)
Feasibility Studies, etc	The Feasibility Study on the Highway No.18 Improvement, Government of Viet Nam, March 1996
Related Projects	JICA "Northern Viet Nam Traffic Master Plan," 1994 JICA "Northern Viet Nam National Roads Traffic Safety Improvement Project," 2007 - 2013 Chi Linh – Bieu Nghi Section was improved with loan from the South Korean Government: May 1999

2. Outline of the Evaluation Study

2.1 External Evaluator

Atsushi Tokura, IC Net Limited

2.2 Duration of the Evaluation Study

Duration of the Study: December 2010-November 2011

Duration of the Field Study: March 5 - 18, 2011 and July 21 - 27, 2011

2.3 Constraints during the Evaluation Study

None.

3. Results of the Evaluation (Overall Rating: B[2])

3.1 Relevance (Rating: ③[3])

3.1.1 Relevance with the Development Policies of Viet Nam

At the time of the appraisal, the Government of Viet Nam had focused on investment in the transport sector, especially the road sub-sector. Under the Public Sector Investment Plan 1996 -

[2] A: Highly satisfactory; B: Satisfactory; C: Fairly Satisfactory; D: Unsatisfactory
[3] ③: High; ②: Fair; ①: Low

2000, approximately four billion USD, a quarter of total public investment, was to be invested in the transport sector. Of the nearly four billion USD, 2.2 - 2.5 billion USD was to be allocated to the road sub-sector. The importance of the transport sector has not changed since then. Between 2000 and 2005, 27.5% of the national budget was allocated to the transport and telecommunication sector[4].

The Socio-Economic Development Strategy (2000-10) and the five-year Socio-Economic Development Plan (2006-10) regard National Highway No. 18 as well as the highways No. 1, 5 and 10 as major arterial roads for the economic corridor in the northern region to contribute to economic development.

The Study on the National Transport Development Strategy in the Socialist Republic of Viet Nam in 2000, which was the basement of the National Transport Development Strategy for 2020, considered the improvement the highway No. 18 as one of the most important projects among the primary road[5] improvement projects. The Comprehensive Study on the Sustainable Development of Transport System in Viet Nam in 2010 also considered the highway as one of the major transport corridors. Under the Kunming-Hai Phong Transport Corridor Project, which is being implemented with the support of the Asian Development Bank (ADB), the highway No. 18, as well as the highways No. 5 and 10, is considered as the critical infrastructure of the Kunming-Hai Phong Corridor.

In summary, relevance of the project to Viet Nam's development policy is still high, as the road sub-sector has remained important and National Highway No. 18 is still regarded as a major arterial road in the region.

3.1.2 Relevance with the Development Needs of Viet Nam

The Government of Viet Nam has positioned the Hanoi-Hai Phong-Ha Long triangle zone as the major development area in Viet Nam and tried to develop industrial zones along National Highway No. 18. Tourism development was also anticipated by utilizing natural environment in the Ha Long Bay area. However, the traffic flow of the highway No. 18 was disturbed by deteriorated surface of the road and aging bridges. In addition, cars and passengers had to use a ferry boat to cross a river and bay at some part of the highway.

Since the improvement of the highway, several industrial parks were found to be developed along the highway at the ex-post evaluation time and the number of tourists in Quang Ninh Province, where Ha Long Bay is located, has increased at an average of 13.7% per year (See "3.4 Impact"). After the improvement of Cai Lan Port in Quang Ninh Province in 2006, the cargo volume of the port has increased and the role of the highway has increased, as the highway directly connects the port and Hanoi.

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[4] The five-year Socio-Economic Development Plan (2006-10). Allocation amount exclusively to the transport sector was not mentioned.

[5] Primary road meant the most important arterial road. Others are called the secondary road and the tertiary road (the third level, rural road)

Passenger and freight traffic volume by road has been continuously high in the transport sector in Viet Nam. Growth rates of passenger and freight traffic of Hanoi City, Bach Ninh, Hai Doung, and Quang Ninh provinces along the highway are higher than the national average.

Table 1: Growth Rate of Passenger and Freight Traffic by Province

Unit: %

	Average growth rate between 2001and 2008	
	Passenger traffic	Freight traffic
Hanoi City	25.7	30.5
Bach Ninh	12.4	26.6
Hai Doung	24.7	21.5
Quang Ninh	13.6	23.8
National average	11.0	18.2

Source: General Statistics Office of Viet Nam

The project's relevance with development needs is high. In the city and provinces along the highway, both passenger traffic and freight traffic have steadily increased compared to the time of the appraisal, due in large part to the development of several industrial parks and the increase of cargo volume of the Cai Lan port.

3.1.3 Relevance with Japan's ODA Policy

The Japan International Cooperation Agency (JICA) has been focusing its assistance to Viet Nam on economic infrastructure development for its yen loan assistance. Especially the transport sector including the road sub-sector, as well as power sector, is the most important sector for JICA's assistance[6]. JICA has continuously supported the transport sector. For instance, the development studies titled The Study on the National Transport Development Strategy in the Socialist Republic of Viet Nam in 2000 and The Comprehensive Study on the Sustainable Development of Transport System in Viet Nam in 2010 were implemented. Thus the project is consistent with Japan's ODA policy in Viet Nam.

In conclusion, this project has been highly relevant with Viet Nam's development plan, development needs, as well as Japan's ODA policy, therefore its relevance is high.

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

The project improved the road and bridges in approximately 133 km from the Hanoi side: Noi Bai - Chi Linh section (68 km) and Biue Nghi-Cua Ong section (65 km), both of which needed urgently upgrading. The 35 km-long, four-lane motorway from Noi Bai to Bach Ninh was newly constructed and the existing road was expanded and improved in other parts of the highway. Moreover, new toll gates and buildings for road management were built, and equipment for operation and management was provided under the project. The road in Chi

[6] Yen Loan Country Assistance Implementation Plan for Viet Nam

Linh-Biue Nghi section was improved with loan from the South Korean Government in 1999.

(1) Construction works

Construction works were completed nearly as planned with some adjustments and additional works (See Table 2). To reduce necessary land for construction, some culverts were constructed instead of bridges, as the height of embankment for culverts is lower than that of embankment for bridges and culverts need less land. The number of the toll gates was reduced from four to two. This change was caused by the Government's policy change, which required any two toll gates to be 70 km apart at the minimum. The number of buildings for road management was considered to be reduced, as the number of the toll gates was reduced. However, the project constructed a building for the newly constructed motorway between Noi Bai and Bach Ninh, due to the request from the Project Management Unit No. 2 (PMU2). In total, three buildings for road management were built.

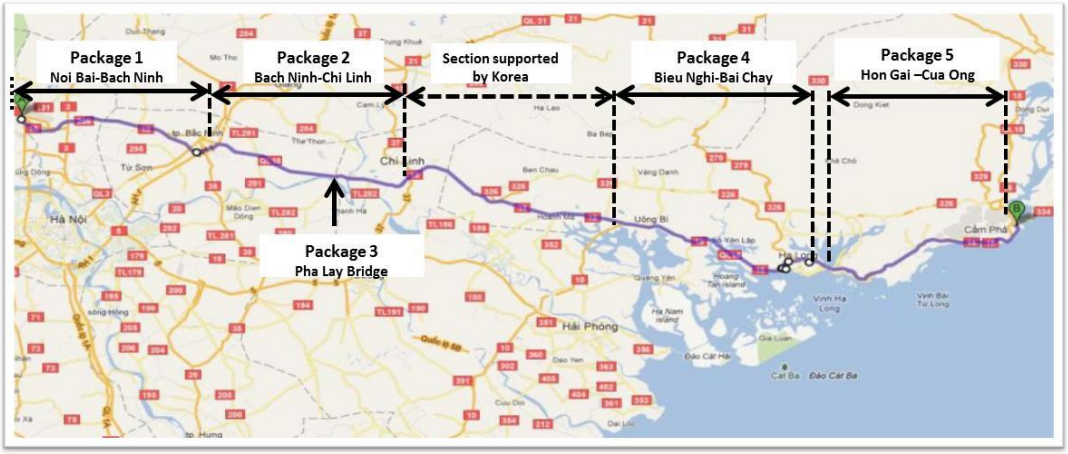

Figure 1: Overall Picture of the Project

Table 2: Changes and Additional Outputs

Package	Section	Distance	Design changes	Additional outputs
1	Noi Bai-Bach Ninh	31.3 km	Beginning point of the highway was moved to the intersection with National Highway No. 2	・Additional interchange with National Highway No. 1 bypass and 295 ・Additional flying over at the east side of ・the intersection with National Highway No. 2 ・One additional bridge (from 22 to 23) ・Additional culverts for pedestrians and waterways ・Soft soil treatment
2	Bach Ninh-Chi Linh	36.4 km	・Reducing number of the bridges from 7 to 3 ・Design changes of some bridges	・Four additional culverts for pedestrians and waterways instead of bridges ・Soft soil treatment
3	Pha Lai Bridge	579 m		・Soft soil treatment
4	Bieu Nghi-Bai Chay	26.0 km	・Widening some parts of road beds and roads ・Reducing number of the bridges from 7 to 4	・Replacement of Dai Yen Bridge ・Three additional culverts instead of bridges ・Construction of access road to Cai Lan port ・Construction of access road to Bai Chay bridge

5	Hon Gai-Cua Ong	38.7 km	·Reducing number of bridges from 14 to 4 ·Design change of the three bridges	·Increasing lanes from 2 to 4 in Hon Gai (8 km) and Cua On (11 km) ·Construction of culverts for pedestrians instead of bridges ·Construction of access road to Bai Chay Bridge
6	Toll gates and buildings		· Reducing number of toll gates from 4 to 2 · Reducing number of buildings for road management from 4 to 3	

The design changes and additional outputs shown in Table 2 were caused by requests from the city and provinces along the highway when the detailed design was developed. Those changes delayed the project activities. However, to increase the effectiveness of the project, those changes and additional outputs were appropriate.

The project decided to produce additional outputs using the residual project fund and other resources in 2002 as follows.

- Package 1a: Widening Noi Bai-Bach Ninh Section to four lanes (32.7 km)
- Package 3a: Improvement of Bieu Nghi-Pha Rung section (14.6 km)
- Package 4a: Construction of Cua Ong bypass (3.5 km)

Package 1a, construction of four-lane motorway in Noi Bai-Bach Ninh Section, was already considered at the time of the appraisal in 1997. However, it was decided to construct a two-lane highway first and widen it to four lanes after assessing the increase of the traffic volume of the section and the progress of urbanization in the area. It was decided to widen the road in 2002, as the traffic volume had increased more than expected. However, the first 1.5 km from the beginning point in the Noi Bai area still remains as two-lane road. The highway also becomes two lanes just before the intersection with National Highway No. 1.

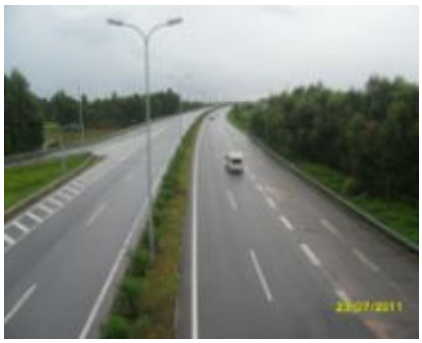

Fig. 2: Motorway in the Noi Bai -Bach Ninh section

The reason why the beginning part of the highway remains as two-lane road is that the PMU2 was unable to secure financial resources[7]. This part will be widened to four lanes when the intersection with the National Expressway No. 2 is constructed with the financially assistance of the ADB. As of July 2011, the two-lane part of the No. 18 was closed for the construction of the interchange with the expressway No. 2. After completing the intersection, the first 600 m of 1.5 km will be widened to four lanes. There is, however, no plan to widen the

[7] According to the PMU2, the actual project cost was more than planned in Vietnamese dong terms but lower than planned in yen terms, due to the appreciation of the Japanese yen. Value of Vietnamese dong has dropped approximately 33% since the project started.

remaining 900 m. The PMU2 explained that another two-lane part of the highway at the intersection with the highway No. 1 will be widened when the expressway between Bach Ninh and Ha Long is constructed.

Besides the above additional three outputs, by utilizing the residual project fund, it was approved to improve roads in Chi Linh City in 2002, to construct the approach and access roads to Bai Chay Bridge in 2003, to improve roads in Bach Ninh City and protected the slope of the approach road to Bai Chay Bridge in 2005, and to improve the Provincial Road No. 295 in 2005 and 2007.

(2) Consulting services

The project provided consulting services not only to National Highway No. 18 project but also engineering services such as detailed design to Bai Chay Bridge construction project. In addition, consulting service for bidding and contract support and supervision of the construction were provided to Bai Chay Bridge project. Regarding the consulting service for No. 18 project, inputs for supervision consulting were increased, as the project period was extended due to the scope changes (See Table 4). The PMU2 tried not to increase the cost by using the Vietnamese consultants instead of foreign ones. It can be determined that quality of construction was maintained, although the service was managed mainly by the Vietnamese consultants, as the PMU2 is satisfied with the consulting service for National Highway No. 18 project.

(3) Equipment for operation and maintenance

32 types of equipment[8] were provided by the project (Package 6) and delivered to the PMU2, the Directorate for Roads of Viet Nam (DRVN), the Department of Transport in Quang Ninh Province (PDOT-QN) and the Institute of Transport Science and Technology (ITST). According to the PMU2, the equipment was provided as planned.

3.2.2 Project Inputs

(1) Project cost

The total project cost was originally 27,868 million yen and revised to 28,775 million yen after the detailed design. The actual cost was 25,367 million yen[9], which was 88.2% of the revised cost. The original cost includes consulting fee for Bai Chay Bridge project and the actual cost includes construction fees for approach and access roads for Bai Chay Bridge, construction fee for the slope protection of the approach road and consulting fee for Bai Chay Bridge project[10]. If these costs for Bai Chay Bridge project were excluded, the revised original

[8] Asphalt and concrete saw cutter, air compressor, vibratory roller, centrifugal water pump, pick-up truck, road patrol car, etc.

[9] The exchange rate applied is 1 yen =131.77 Vietnamese dong, which is the average rate during the project period.

[10] At the appraisal time for the Bai Chay Bridge project, it was decided that National Highway No. 18 project covers the cost for the consulting service for Bai Chay Bridge and construction of the approach and access roads to the bridge.

cost and actual cost were 28,220 and 22,934 million yen, respectively, and the actual cost was 81.3 % of the revised original cost. Therefore, the sub-rating for the project cost is ③, as the actual cost was lower than planned.

The main reasons why the actual cost was lower than the planned cost were as follows: (i) efficient order by the open bidding system, and (ii) depreciation of the Vietnamese dong against the Japanese yen.

(2) Project period

The project was scheduled for 53 months from March 1998 to July 2002 at the times of appraisal. However, it took 123 months to complete the project, including additional packages (Please see Table 3). This was 232% of the planned period. The sub-rating for the project period is ①, as it was significantly longer than planned.

Table 3: Comparison of Planned and Actual Project Period

	Plan[11]		Actual		Comparison (%)
	Period	Months	Period	Months	
Selection of consultants	Nov. 1997- Apr. 1998	6	Jan. 1997 - Apr. 1998	6	100
Detailed design	Jul. 1998 - Feb. 1999	8	Jul. 1998 - Nov. 1999	17	213
P/Q, bidding, contracts	Mar. 1999 - Jul. 2000	17	Mar. 1999 - Nov. 2004 (including additional packages)	69	406
Land acquisition and reallocation	Oct. 1998 - Jun. 2000	21	Apr. 1999 - Jun. 2003 (including additional packages)	51	243
Public works	Sep. 1999 - Jul. 2002	35	Sep. 1999 - Aug. 2007 (Package 1-7) Apr. 2004 - May 2008 (Package 1a、3a、4a)	95 (including additional packages)	271
Total[12]	Mar. 1998 - Jul. 2002	53	Mar. 1998 - May 2008	123	232

The reasons for extension of the project period before the public works were as follows.

- It took more time to complete the detailed design. The consultant team received many requests from the city and the provinces along the highway, so that the team had to change the original design and add the outputs after the negotiation with the city and provinces.
- It took more time to complete the land acquisition and resettlement. It was time-consuming to deal with requests from the affected people. The actual number of affected households increased from 4,017 in the feasibility study (F/S) to 5,415[13]. Details are explained in "3.4.2 Other Impacts."

The substantial extension of the period for "Pre-qualification, Bidding, Contracts" was caused mainly by output changes of the toll gates under Package 6, in addition to the delay of activities for other packages.

The period of construction works took more than planned except Packages 4, 3a, and 4a (Please see Table 4). The major reasons for delays of construction works were as follows.

[11] Total project period of Phases I and II
[12] From the loan agreement signing date
[13] Including the households compensated under Package 1a, 3a and 4a.

- Changes and additional project scopes such as soft soil treatment
- The project was unable to obtain permission to use soil form the provinces. Thus the contractors had to use sand instead. It took time to get approval for the material change from the Ministry of Transport.
- Some contractors were unable to continue the construction works due to the steep rise of fuel and material prices. The contractors did not have enough financial capacity to absorb such cost increase.

Construction works for Package 6 were significantly delayed, as the government regulations of toll gates were revised, as explained above. In addition, according to the PMU2, lack of management capacity of the contractors for Package 6 had caused delays in works.

Table 4: Comparison of Planned and Actual Construction works

PKG	Construction works	Plan		Actual		Comparison
		Start	*End*	*Start*	*End*	(%)
1	Noi Bai-Bach Ninh	Oct. 2000	Oct. 2002	Feb. 2001	Dec. 2003	140.0
2	Bach Ninh-Chi Linh	May 2000	Oct. 2002	Jul. 2000	Feb. 2003	106.7
3	Pha Lai Bridge	Sep. 1999	Oct. 2001	Mar. 2000	Jul. 2002	111.5
4	Bieu Nghi-Bai Chay	Sep. 1999	Oct. 2001	Oct. 1999	Sep. 2001	88.5
5	Hon Gai-Cua Ong	Nov. 2000	Nov. 2002	Mar. 2001	Jul. 2003	116.0
6	Construction of toll gates and buildings for road management	May 2002	Oct. 2003	Sep. 2005	Aug. 2007	133.3
7	Equipment for O&M	Jan. 2000	Jul.2001	Mar. 2003	Oct. 2004	105.3
1a	Noi Bai-Bach Ninh (four lanes)	Apr. 2005	May 2007	Apr. 2005	May 2008	158.3
3a	Bieu Nhhi-Pha Rung	Jun. 2005	Nov. 2006	Jun. 2005	Aug. 2006	89.0
4a	Cua Ong bypass	Jun. 2005	May 2006	Jun. 2005	Aug. 2006	83.3

Note 1: Comparison means actual period / planned period

Although the project cost was within the plan, the project period was exceeded, therefore the efficiency of the project is fair.

3.3 Effectiveness[14] (Rating: ③)

3.3.1 Quantitative Effects

3.3.1.1 Results from Operation and Effect Indicators

(1) Annual average daily traffic (AADT)[15]

a) Noi Bai-Bach Ninh

This section is a newly-built four-lane motorway, completed in 2008. The traffic amount of trucks in 2010 was four times more than the amount forecasted by the F/S in 1996 (Please see Table 5). A major reason could be that Yen Phone Industrial Park was developed along the motorway. In addition, the Vietnamese government instructs truck drivers to bypass Chuong Duong Bridge and use the National Highway No. 18. On the other hand, the traffic amount of

[14] Achievement of promotion of traffic safety, one of the project objectives, is stated in "3.3 Impact"

[15] AADT is calculated based on 12-hour traffic count on the 5th and 6th calendar day of every month and 24-hour traffic count on the 7th calendar day of every month.

cars and buses in 2010 was more than the forecast, but it was less increased compared to that of trucks. Cars and motorbikes can access this motorway section only through interchanges. The Regional Road Management Unit 2 (RRMU2) of the Ministry of Transport, being in charge of operation and maintenance, explained the reason why the traffic amount of cars and buses was less increased that local residents in the section cannot access the interchanges of the motorway smoothly, as the feeder roads along the motorway are not well developed.

Table 5: Annual Average Daily Traffic of Each Section

Unit: number/day

	Achievement					2005 forecast at F/S	Comparison (Achievement/Plan, Note 1)
	1995	2005	2008	2009	2010		
Noi Bai-Bach Ninh							
Total			4,995	5,331	6,254	2,853	219.2%
Car, Bus			2,339	1,896	2,559	1,965	130.2%
Truck			2,616	3,425	3,659	888	412.0%
Bach Ninh-Chi Linh							
Total		2,443	3,744	4,556	5,219	5,260	99.2%
Car, Bus		1,287	2,104	2,261	2,843	2,582	110.1%
Truck		1,156	1,640	2,295	2,376	2,678	88.7%
Bieu Nghi-Bai Chay							
Total	1,747	3,275	7,241	7,609	9,877	4,748	208.0%
Car, Bus	936	1,619	3,334	3,617	5,466	2,153	253.9%
Truck	811	1,656	3,907	3,992	4,411	2,595	170.0%
Hon Gai-Cam Pha							
Total	2,419	9,327	9,110	7,662	8,447	6,535	129.3%
Car, Bus	1,282	3,222	3,973	4,225	5,252	2,893	181.5%
Truck	1,137	6,105	5,137	3,407	3,195	3,642	87.7%

Source: The figures in achievement are from the RRMU2 and the PDOT-QN.
Note 1: The figures in 2010 (2 years after the project completion) are compared to the figures of 2005 in F/S (3 years after the expected project completion in F/S)

b) Bach Ninh-Chi Linh

The traffic amount of this section has steady increased since 2005, however, the amount in 2010 was less than the forecast in 2005. It should be noted, however, the forecast was estimated based on the premise of four lanes. The RRMU2 explained that the traffic flow shifted from No. 18 to No. 5, because National Highway No. 38, connecting No. 18 and 5, was improved.

c) Bieu Nghi-Bai Chay

The traffic amount has significantly increased, and the actual traffic amount in 2010 was 208% of the forecast in 2005. The construction of Bai Chay Bridge in 2006 has also contributed to the increase, beside the improvement of the highway. The level of increase of trucks is lower than that of cars and buses. Some trucks may bypass this section to avoid the tall gate and the checkpoint for over-weighted trucks in the section.

d) Hon Gai-Cam Pha

The traffic amount of trucks has decreased since 2005, while those of cars and buses have

increased more than the forecast. This could be explained by the following reasons: i) it is not easy for trucks to drive through the residential area in Hon Gai town, ii) some trucks, driving from Hon Gai to Hanoi, bypass the section and use the improved Provincial Road No. 326 because of the existence of the tall gate and checkpoint for over-weighted trucks after Bai Chay Bridge, and iii) there have been road maintenance works between Cua On and Mon Cai, where is far north of the project location, from 2008 to 2010.

(2) Saving time

The RRMU2 and the PDOT-QN, both of which are in charge of operation and maintenance, have got no data how much the traveling time has been decreased due to the project, as they have not been supervising travel time. Staff members of PDOT-QN generally acknowledge that it takes three hours now from Ha Long to Hanoi; it was six hours before the improvement. Staff members of the Departments of Transport in Bach Ninh Province and Hai Doung Province also confirmed that the travel time to Ha Long became less than half after the improvement. Reduction of travel time was caused by improvement of the road surface, widened road and construction of the bridge over Pha Lai River, where vehicles and motorbikes had to cross by a ferry boat. In the east part of Bai Chay Bridge, construction of Bai Chay Bridge has also helped reduce the travel time.

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

Economic Internal Rate of Return (EIRR)

Results of recalculation[16] of (EIRR) show that EIRR for Bach Ninh-Chi Linh section and that for Hon Gai-Cua Ong setion are 11.4% and 15.5%, respectively[17]. Those figures are lower than 15.5% for Bach Ninh-Chi Linh section and 20.6% for Hon Gai-Cua Ong section at the appraisal time. The followings are reasons why the recalculated EIRR are lower.

- Fees for consulting and land acquisition and resettlement might not be included in the project cost at the appraisal time.
- Year 2008 is set as a base year for recalculation. Cost and benefit before 2008 are converted to the present value by applying the consumer price index of Viet Nam. Costs figures before 2008 after the conversion are higher than the cost figures expected at the appraisal time.
- The benefit forecast for Bach Ninh-Chi Linh section at the appraisal time was estimated

[16] Economic cost was recalculated based on the costs for civil works, consulting service, operation and maintenance and land acquisition and resettlement. Economic benefit was recalculated based on the benefits of saving in vehicle operating costs and saving in passenger time costs. Necessary data for recalculation of Pha Lai Ferry investment cost saving is not available, so that the estimate benefit at the appraisal time is used.

[17] Recalculation was not conducted for Noi Bai-Bach Ninh section. Cost estimation for the section can be misled, as two-lane motorway was constructed at first and widened to four lanes later. Recalculation for Bieu Nhi-Bai Chay section was not conducted, because it is impossible to compare the recalculated EIRR to one at the appraisal time. The latter was copied from the data when South Korea considered its support for Chi Linh-Bai Chay section. It is not clear the calculation method at that time.

based on the premise of four lanes.

- For the recalculation, cost for Cua Ong bypass (Package 4a) is included for cost for Hon Gai-Cua Ong section.

3.3.2 Qualitative Effects

(1) Travel time and cost

In the beneficiary survey[18], all respondents including the residents, agriculture, industry and commerce personnel and transport service providers answered that travel time was shortened by the road improvement. Regarding the traveling cost, 97% of the residents and 96% of agriculture, industry and commerce personnel and transport service providers responded that fuel cost and vehicle maintenance cost were reduced by the road improvement.

(2) Improvement of access

80% of the residents along the highway responded that access to markets improved by the road improvement, while 14% mentioned improved access to hospitals and 6% improved access to schools (Please see Table 6). Interviews with staff members of the PDOT-QN revealed that residents in the province had better access to medical services in Hanoi through improvement of the highway and construction of Bai Chay Bridge.

Table 6: Improvement of Access by Road Improvement (Residents)

(N=125)

Question	Improved	
	Count	%
Market, business center	100	80.0
Hospitals	17	13.6
Schools	8	6.4

The beneficiary survey found that 96% of the agriculture, industry and commerce personnel thought that the project made it easier to acquire necessary materials for their business, and 84% thought that access to new markets in the distance, to where they could not bring their products before the improvement of the highway, became easier (Please see Table 7). 63% of them answered that access to the markets in Hanoi became easier.

Table 7: Improvement of Access to Markets by the Project
(Agriculture, industry and commerce personnel)

(N=25)

Question	Become easier		Not easier	
	Count	%	Count	%
Acquiring necessary materials for business	24	96	1	4
Access to new markets	21	84	4	16

In conclusion, this project has largely achieved its objectives, therefore its effectiveness is

[18] A beneficiary survey was conducted in the form of one-on-one interviews with 175 people including 125 local residents, 25 farmers and personnel from shops and companies, and 25 transport service providers along the highway.

high.

3.4 Impact

3.4.1 Intended Impacts

This section examines the project's contribution to socio-economic development such aspects as growth of industrial output, retail sales, agriculture output, foreign direct investment, and poverty reduction in the northern region. It also looks into whether or not the project has had any negative impact such aspects as traffic accident, environment deterioration and resettlement.

(1) Industry and trade

a) Industrial output

As shown in Table 8, the proportion of the industrial output in Hanoi City, Bach Ninh, Hai Doung and Quang Ninh Provinces to the industrial output of Viet Nam as a whole has increased. The proportion of the industrial output in Bach Ninh has increased the most. It is assumed that the development of Yen Phone and Que Vo industrial parks after the improvement of the highway has contributed to the increase. The occupancy rate of both industrial parks is high, such as Cannon Inc. in Que Vo industrial park[19]. It is fair to say that the improvement of the highway has contributed to the development of new industrial parks and increase of investment in the parks.

In Quang Ninh province, the construction works for the highway were completed in July 2003. The proportion of the industrial output in the province to the industrial output of Viet Nam has increased since 2004. It is assumed that the project has contributed to increasing the industrial output in the province. However, it should be noted that the expansion of Cai Lan Port and the construction of Bai Chay Bridge in 2006 also contributed to industrial output growth in Quang Ninh Province.

Table 8: Shares of Provinces in Terms of Industrial Output

Unit: %

	Year 2000	2001	2002	2003	2004	2005	2006	2007	2008
Hanoi City	8.19	7.84	8.98	9.40	9.32	9.18	9.33	9.43	9.21
Bach Ninh Province	0.80	0.87	0.95	1.10	1.08	1.31	1.35	1.42	1.55
Hai Doung Province	1.10	1.06	1.18	1.18	1.10	1.18	1.21	1.39	1.35
Quang Ninh Province	1.95	1.77	2.05	1.95	2.09	2.13	2.27	2.59	2.89

Source: General Statistics Office of Viet Nam

Growth rates in Hanoi City and Hai Doung province are not high as in Bach Ninh and Quang Ninh Provinces. National Highway No. 18 passes through just a part of Hanoi City and Hai Doung province. Thus the improvement of the highway might not have an impact so much on industrial output in the city and the province.

[19] JETRO "Data of industrial parks in Northern and Central Viet Nam"

b) Commerce

As shown in Table 9, the average growth rates of retail sales in Hanoi City and Bach Ninh Province from 2001 to 2009 are higher than that of the country. As the highway is the major road in Bach Ninh Province, the improvement of the highway might have contributed to invigorating commercial activities in the province.

Table 9: Annual Growth Rate of Retail Sales

Unit: %

	YEAR 2001	2002	2003	2004	2005	2006	2007	2008	2009	AVERAGE GROWTH RATE		
										2001- 09	-2003	2004-
Hanoi	8.5	17.3	19.0	20.6	22.1	35.4	23.9	44.1	18.1	24.8	14.8	28.4
Bach Ninh	19.4	17.5	27.5	27.6	21.0	22.7	32.3	48.0	16.2	26.3	21.4	27.6
Hai Doung	-1.6	17.8	9.7	9.1	12.6	15.8	21.6	33.0	10.5	18.5	25.3	20.1
Quang Ninh	58.5	12.4	10.0	25.2	20.4	14.2	19.6	31.7	15.3	16.0	8.7	18.5
National average	11.3	14.5	18.8	19.4	20.5	24.1	25.2	35.0	20.6	22.1	14.8	25.0

Source: General Statistics Office of Viet Nam
Note 1: Growth rate means increase versus previous year.
Note 2: Figures in 2009 are forecast.
Note 3: The growth rate of Hanoi includes former Ha Tay Province from 2008.

The beneficially survey also shows that 22 of 24 interviewees (92%) involved in commercial activities in Bach Ninh Province answered that their business opportunities were enhanced after the project. Among them, 19 of 24 interviewees (79%) answered that their business opportunities were enhanced due to the project (See Table 10). This ratio is higher than total in the city and provinces along the highway. It is thus fair to say that there is a linkage between the project and growth of commercial activities in Bach Ninh Province.

Table 10: Linkage between the Project and Commercial Activities

	Business opportunities increased after the project		The project increased opportunities	
	Count	%	Count	%
Bach Ninh (n=24)	22	92	19	79 (19 of 24)
Total in the city and provinces along the highway (n=54)	45	83	38	70 (38 of 54)

c) Agriculture

As indicated in Table 11, the average growth rate of agriculture output in Bach Ninh, Hai Doung and Quang Ninh Provinces from 2001 to 2009 has been lower than that of Viet Nam as a whole. It is contrary to the trends in industrial output[20]. The growth rate has low especially since 2003, although this is the general phenomenon in Viet Nam.

According to the beneficiary survey, many interviewees knew people who stopped farming and started working in the industrial and/or commercial sectors during and after the project[21].

[20] The growth rate of Hanoi includes former Ha Tay Province from 2008.
[21] 97 interviewees answered that they know somebody who stopped farming and started working in the industrial and/or commercial sectors during and after the project. When the 97 interviewees were asked how many such former farmers they know, they answered that they knew 3,733 former farmers in total.

On the other hand, the project did enhance business opportunities among the farmers along the highway. 57% of the interviewees[22] in the agriculture sector answered that their opportunities were enhanced after the improvement of the highway and 43% of them answered that their business opportunities were enhanced due to the improvement of the highway.

Along the highway, the workforce has shifted from the agriculture sector to the industry and commercial sectors. However, the agricultural output has increased, although the growth rate is lower than that of Viet Nam as a whole. There are cases that the improved highway has enhanced opportunities among farmers. It is thus fair to say that the project has not negatively affected agriculture so far.

Table 11: Annual Growth Rate of Agriculture Output

Unit: %

	YEAR 2001	2002	2003	2004	2005	2006	2007	2008	2009	AVERAGE GROWTH RATE		
										2001- 09	-2003	2004-
Hanoi	2.1	3.7	5.8	3.6	2.4	2.8	2.3	14.9	0.5	4.4	3.8	4.5
Bach Ninh	2.4	6.4	4.2	3.3	3.0	0.3	-0.9	4.7	5.0	3.2	4.3	2.4
Hai Doung	0.4	7.7	1.2	3.6	0.0	1.4	2.4	3.4	-3.0	2.0	7.1	2.0
Quang Ninh	6.8	5.6	8.8	6.0	11.4	-10.6	10.7	0.1	0.1	3.8	3.1	0.8
National average	2.6	6.2	4.5	4.1	3.2	4.1	3.6	6.9	2.2	4.3	4.4	4.0

Source: General Statistics Office of Viet Nam
Note 1: The Output is calculated based on the 1994 output as a base year.
Note 2: Figures in 2009 are forecast.
Note 3: The growth rate of Hanoi includes former Ha Tay Province from 2008.

d) Foreign direct investment

As shown in Table 12, the provincial portion to the country as a whole in terms of the number of foreign direct investment projects in Hanoi City and Bach Ninh Province has increased from 2005 to 2009. In fact, several industrial parks among 23 parks, located in the northern region, were developed along National Highway No. 18 in Hanoi and Bach Ninh after the improvement of the highway. The improvement of highway has promoted the development of industrial parks and attracted foreign direct investment in the parks.

Table 12: Number of Foreign Direct Investment Projects
and Provincial Portion to Viet Nam as a Whole

	Year 2005	2006	2007	2008	2009	Total
Hanoi	116	150	255	218	298	1,037
	12.0%	15.2%	16.5%	18.6%	24.7%	
Bach Ninh	14	18	35	31	32	130
	1.4%	1.8%	2.3%	2.6%	2.6%	
Hai Doung	11	46	45	40	9	151
	1.1%	4.7%	2.9%	3.4%	0.7%	
Quang Ninh	13	10	12	11	6	52
	1.3%	1.0%	0.8%	0.9%	0.5%	
Viet Nam as a whole	970	987	1,544	1,171	1,208	5,880

Source: General Statistics Office of Viet Nam
Note 1: Upper row is number of projects; lower row is portion to Viet Nam as a whole.
Note 2: Figures in 2009 are forecast.

[22] 8 of 14

e) Tourism

The improvement of the highway seems to be making a positive impact on tourism in Quang Ninh Province, where there are several tourist spots such as Ha Long Bay, a UNESCO World Heritage site. In fact, the number of tourists to the province has increased annually 14% since 2000[23].

(2) Poverty reduction

Table 13 shows that the poverty ratios in all the city and provinces along National Highway No. 18 have decreased more than the national average. In the beneficiary survey, 87% of the residents answered that their household income improved after the improvement of the highway.

Table 13: Poverty Rate

Unit: %

	Year 2006	2007	2008	Annual reduction rate
Hanoi	3.0	2.9	2.4	-11.0
Bach Ninh	8.6	8.2	7.5	-7.0
Hai Doung	12.7	12.1	10.1	-11.0
Quang Ninh	7.9	7.5	6.4	-10.0
National average	15.5	14.8	13.4	-7.0

Source: General Statistics Office of Viet Nam

In the city and provinces along the highway, industry and commerce have developed, while agriculture output has increased. In addition, urbanization has progressed along the highway and the population in the urban areas has increased more than in the rural areas.[24] Such facts have contributed to poverty reduction along the highway[25].

3.4.2 Other Impacts

(1) Number of traffic accidents

The number of traffic accidents along National Highway No. 18 in Hai Doung Province has decreased, while the number in Bach Ninh Province significantly increased in 2010 (See Table 14). In Quang Ninh Province, the number was decreased in 2010, compared to 2000. The reason for the significant increase in Bach Ninh Province is unclear. It is necessary to assess what impact a new four-lane motorway in the province has had on the number of the accidents.

In Hai Doung province, some measures to prevent a traffic accident have been introduced under the JICA yen loan project, “Northern Vietnam National Roads Traffic Safety Improvement Project,” The project above has tried to raise awareness of local people on how best to reduce accidents at governmental organizations, schools, and factories along National Highway No. 18. Meanwhile, Hai Doung Province has also introduced its own measures to

[23] Quang Ninh Province
[24] General Statistics Office of Viet Nam
[25] In Vietnam, it is assumed that poverty reduction is in direct proportion with urbanization. In 2008, the poverty rate was 3.3% in the urban areas and 18.7% in the rural areas.

reduce traffic accidents such as speed limits in the residential areas and speed bumps at the access roads to the highway26. Those measures may have had a positive effect on reduction of traffic accidents in Hai Doung Province, as the number of accidents has decreased since 2008 along the highway No. 18. While the project constructed a bypass road in Cua Ong, Quang Ninh Province has also introduced measures such as improvement of intersections, constructing bypass roads, installation of traffic lights and signs and pavement maintenance. So far, the project has had no negative impact on increase of traffic accidents.

Table 14: Number of Traffic Accidents along National Highway No. 18

Unit: number of accidents

	2000	2003	2004	2005	2006	2007	2008	2009	2010
Bach Ninh Province									
No. of accidents		27	19	25	33	33	33	34	87
No. of deaths			19	33	37	35	35	38	60
No. of casualties				13	16	12	4	10	69
Hai Doung Province									
No. of accidents				36	40	44	35	26	23
No. of deaths				26	24	27	19	21	19
No. of casualties				52	55	41	30	21	14
Qunag Ninh Province									
No. of accidents	215			77					97
No. of deaths									
No. of casualties									

Source: Department of Transport in Bach Ninh, Hai Doung and Quang Ninh Provinces

(2) Impacts on the natural environment

Improving the road surface under the project was expected to reduce dust. Some measures were also introduced to improve the environment and safety. For instance, it was prohibited to build a house within 3 m from the edge of the road (5 m for Noi Bai-Bach Ninh section) and 7 m from the embankment of the bridge. Moreover, several meetings for the residents were held to explain the countermeasures for land acquisition and resettlement.

During the construction period, environment monitoring was regularly conducted by the PMU2, the Provincial People's Committee, consultants and construction companies.

Since the construction was finished, no regular environment monitoring has been conducted. The Department of Transport in Bach Ninh and Hai Doung Provinces have not received complaints about the environment from the residents. The Department of Transport in Quang Ninh Province gave some instructions to truck companies to cover the truck bed, as some complaints were raised from the residents along National Highway No. 18. However, staff members of the department admitted that the effectiveness of their instructions is uncertain, as the instructions do not have means of enforcement with punishment[27].

As shown in Table 15, many residents answered in the beneficiary survey that air and noise pollution worsened during and after the project. It should be noted that, however, air and noise

[26] Department of Transport, Hai Doung Province
[27] PDOT-QN

pollution could have become worse even without the project, as the traffic volume has increased and urbanization has occurred. In fact, 98% of the residents answered in the survey that they received benefits from the project, and the residents, who complained about air and noise pollution in the survey, did not answer their specific problems. In addition, the number of complaints about environment deterioration is not many in the provinces. Thus it is fair to say that the project has not given a significant negative impact on the environment.

Table 15: Consciousness among the Residents about the Environment

	During the construction						After the construction					
	Worse		No change		Improved		Worse		No change		Improved	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Air	94	75.2	31	24.8	0	0.0	91	72.8	27	21.6	7	6.0
Noise	103	82.4	21	16.8	1	0.8	101	80.8	23	18.4	1	0.8

(3) Land acquisition and resettlement

4017 households were expected to receive financial compensation for land acquisition in the F/S[28]. 2288 among them were expected to move in newly developed areas by the Government and rebuilt their houses. In the detailed design, 4,017 households were expected to receive financial compensation and 663 among them were to move in newly developed area. In actual, 5415 households received financial compensation and 1,278 among them moved to newly developed area by the Government and rebuilt their houses. The number of compensated and reallocated households significantly increased more than planned in Noi Bai-Bach Ninh section. The reason was that an additional intersection was built in the section.

The cost of land acquisition and reallocation was approximately four times the planned amount: 148.5 billion dong was planned but the actual cost was 627.3 billion dong. The reasons for such increase were that the number of households affected increased and the unit price of financial compensation increased due to an increase in land prices.

29 among 125 interviewees in the beneficiary survey were compensated. 27 of the 29 answered that they were dissatisfied with the compensation and reallocation scheme. The result was contrary to that of the ex-post evaluation for National Highway No. 10 Improvement Project in 2010 in which few interviewees were dissatisfied with the compensation and reallocation scheme[29]. The PMU2 explained that many residents along National Highway No. 18 complained about the scheme because land prices had increased significantly recently. They think that they should have received more compensation in light of the higher market prices. The scheme is the same for both the No. 10 and No. 18 projects. The difference is that land prices increased along the No. 18 more than the No. 10, as urbanization is more progressed

[28] The households are those whose houses are affected, not their land and fields. The number of 4,017 in the F/S did not include the households in Bieu Nhi - Bai Chay section. In the F/S, the number was estimated based on the plan that Hon Gai-Cua Ong section would be widened to four lanes.

[29] "Ex-post Evaluation Report of Japanese ODA Loan Projects 2009 (Vietnam II ・ China II)", June 2010

along the No. 18. It is assumed that the residents along No. 18 tended to complain more about the scheme they received, because they looked at the rising land price.

(4) Capacity enhancement among engineers

Technical training was provided to the Vietnamese engineers as a part of consulting service (Overseas/Domestic). According to PMU2, new technologies were introduced under the project such as compacted sand piles and hard pre-beam girder reinforcement and these newly acquired technologies have been utilized by other projects.

(5) Others

- As mentioned in qualitative effects under Effectiveness, a positive impact on health condition for residents along the highway is expected, as the access to the medical institutions in Hanoi is improved.
- Pha Lai Ferry was abolished after the construction of the bridge. Among the staff members of the ferry company, some chose early retirement and nearly all others got a position at the RRMU2 and have engaged in road operation and maintenance and toll fee collection. No negative impact such as increase of unemployment has been seen from the abolishment of the ferry.

This project had given a positive impact on socio-economic development in northern Viet Nam, while no significant negative impact is found in the field of traffic accident, environment and resettlement.

3.5 Sustainability (Rating: ②)

3.5.1 Structural Aspects of Operation and Maintenance

The Directorate of Roads in Viet Nam (DRVN) of the Ministry of Transport is responsible for overall road operation and maintenance (O&M). The RRMU2, which is a subordinate organization under the DRVN, is in charge of O&M activities between Noi Bai and Chi Linh, while the PDOT-QN is responsible for the section between Chi Linh and Cua Ong. Actual O&M activities are outsourced to two companies: Management and Road Construction Company 248 (contracted with the RRMU2) and Transport Management and Construction Limited Company (contracted with the PDOT-QN). Those state companies had been organizations under the DRVN and became companies after the revision of the Company Law in Viet Nam.

Those companies report their O&M activities to the RRMU2 and the PDOT-QN on a regular basis. Then the RRMU2 and the PDOT-QN are to submit the progress report of O&M activities to the DRVN.

As mentioned above, the PDOT-QN is in charge of O&M activities for certain sections of the highway, although that is a provincial organization. There was a question on how effective it

is for the provincial organization to work under the DRVN. However, according to RRMU2, the PDOT-QN and the RRMU2 conduct the same O&M activities under the direction of the DRVN with a budget from the DRVN. Thus there is little problem to maintain organizational coordination among the stakeholders. In fact, O&M activities of half the national highways in Viet Nam are conducted by a provincial organization such as the PDOT-QN under the direction of the DRVN.

Management and Road Construction Company 248 is conducting O&M activities for National Highway No. 38 and Transport Management and Construction Limited Company does for National Highway No. 279. Both companies have been also involved in bridge management, ferry operation and toll fee collection activities. Such experiences enable those companies to carry out O&M activities efficiently.

3.5.2 Technical Aspects of Operation and Maintenance

Management and Road Construction Company 248 has 323 staff members in total and 77 of them are engineers with university degrees. Transport Management and Construction Limited Company has 169 staff members in total and 16 of them are engineers with university degrees. Both companies have enough engineers and personnel to conduct necessary O&M activities. Both companies provide training opportunities to their staff members responsible for O&M activities every two years inside the companies. They also dispatch their staff members to the training courses organized by the DRVN. Staff members conduct O&M activities by following the national standard specification, although there is no specific O&M manual for National Highway No. 18.

3.5.3 Financial Aspects of Operation and Maintenance

There are three types of O&M activities: regular maintenance, periodic maintenance and emergency maintenance. Budgets for all types of maintenance are lacking. The RRMU2 just secures 50% of the necessary cost for a regular maintenance and 30-40% of that for periodic maintenance. The PDOT-QN also secures only half the necessary cost (Please see Table 16).

Table 16: Necessary Cost and Budget Allocation for PDOT-QN

Unit: million Vietnamese dong

Year	Necessary cost (A)	Actual budget allocation (B)	Gap (B/A)
2008	12,000	5,988	49.9%
2009	9,000	4,484	49.8%
2010	12,000	5,798	48.3%

Source: PDOT-QN

There are two toll gates along National Highway No. 18. 15% of toll fees collected can be used for operation fees such as salary of the personnel of the companies which conduct toll fee

collection and the collection related activities. 5% and 80% of them are submitted to the DRVN and the national account, respectively.

The road maintenance fund was decided to be established in November 2008 to secure financial resources for O&M. However, details of fund mechanism are not yet decided and the fund is not effective at the time of the ex-post evaluation. It will be difficult to secure fully enough financial resources for O&M activities from now on.

3.5.4 Current Status of Operation and Maintenance

Under the project, 32 kinds of machines and equipment for O&M were provided to the DRVN, RRMU2, PDOT-QN and ITST. All of them were still being used except personal computers, whose version is outdated.

Regular maintenance activities include installing guard rails, maintenance of pavement, repair of road surface and roadbed, and installation of street gutters.

Some road sunk parts are found in Noi Bai-Bach Ninh section, although soft soil treatment to prevent road sinking was conducted. There are also some sunk parts around the Pha Lai Bridge and in the Bieu Nghi-Bai Chay sections. The PMU2 and the RRMU2 explained the reasons as follows.

- Adoption of the Prefabricated Vertical Drain (PVD)[30]was not adequate for the sections.
- Sufficient time was not secured for consolidation settlement[31].
- The number of drains was not enough.

Both the PMU2 and the RRMU2 proposed that an intensive investigation be carried out to find out reasons for road sinking and to prevent further sinking, as the sinking is caused by multiple and complex reasons. It is also heard that the sinking may be caused in the motorway section, because the embankment is too high. Some maintenance works have been already conducted. The DRVN approved a project to cover the sunken parts with pavement.

It is found that safety measures are not followed adequately in Noi Bai-Bach Ninh section. This section is a four-lane motorway only for cars, buses, trucks and motorcycles. However, some pedestrians and bicycle riders use the motorway. The acceleration lane from Yen Phone Industry Park is not long enough and cars and trucks from the industrial park have to pull into traffic without increasing the speed sufficiently. PMU2 explained that the industrial park was developed after the

Fig. 3: The acceleration lane from Yen Phone Industrial Park.
The motorbike is trying to cross the motorway.

[30] A method used for the settlement and consolidation of clay ground by sticking up numbers of vertical drains
[31] The process in which reduction in volume takes place by expulsion of water under long term static loads

completion of the motorway and such intersection with the park was built by following the request from Bach Ninh Province. Local people cross the motorway by removing the guard rail of the center divider in front of Yen Phone Industrial Park.

The new expressway No. 3 is under construction along Noi Bay-Bach Ninh Section. Guard rail of No. 18 was removed and trucks from the construction site pull into traffic without increasing the speed[32].

As mentioned in "3.2 Efficiency," the first 1.5 km of the motorway from the Noi Bai point remains a temporary structure and one bridge is also still a temporary one. The embankment of the temporary bridge is protected from erosion by a gabion structure[33]. However, wires to hold stones are rusted and do not look strong enough to hold stones for a long time.

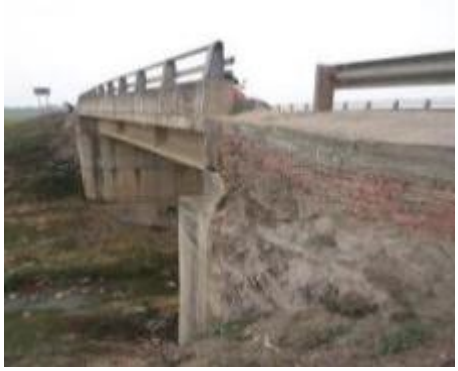

Fig. 4: Condition of the temporary

According to the PDOT-QN, over-weighted trucks are a major cause of road deterioration. There had been 27 checkpoints in the country to weight a truck. They were abolished to smooth the traffic flow, but one checkpoint remains now as a pilot only along the National Highway No. 18[34]. The DRVN has been gathering data from the pilot checkpoint and analyzing how effective the checkpoint should be. The result of the study will be released within the Ministry of Transport in early 2012 and utilized when the Ministry formulates a detailed plan for the checkpoints installation. 41 checkpoints in total will be installed nationwide in the future.

Chi Linh-Bieu Nghi Section, financially supported by the South Korean Government, is narrower than the other parts of the highway. It was found that the surface of the road was cracked[35].

In conclusion, no issue is found in terms of structural and technical aspects of O&M, while road safety is not fully assured in Noi Bai-Bach Ninh section. Continuous countermeasures for road sinking will be necessary, although some measures have been already taken. There is a slight issue in terms of financial aspects. Therefore the sustainability of the project effect is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The objective of this project is to promote traffic safety and facilitate efficient logistics and distribution of goods by improving a part of National Highway No. 18, from Noi Bai near the

[32] As of July 2011. Such intersection is also found along the National Highway No. 1.
[33] Cages filled with stones to prevent erosion of embankment
[34] The other checkpoint is installed in the southern region.
[35] JICA Vietnam Office pointed out the possibility that deterioration of Korean supported section may negatively affected the effectiveness of the highway.

international airport to Cua Ong in Quang Ninh Province (approximately 135 km), which had to be improved urgently. Relevance of the project is high, as the project objective is relevant with Vietnamese development policy and needs and Japan's ODA policy. After the improvement of the highway, traffic amount has increased and various benefits have been realized for the residents along the highway. Some positive impacts have already realized on social and economic development. The efficiency of the project is just fair, as the project period was longer than planned. It is expected that achievement of the project will be sustained, as the project has no problem in terms of organizational and technical aspects, although the project has an issue in terms of financial aspects besides road safety issues. In light of the above, this project is evaluated to be satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing and O&M Agencies

(1) Measures to secure safety at motorway

As mentioned in "3.5 Sustainability," safety measures are not followed adequately in Noi Bai-Bach Ninh section. Some pedestrians and bicycle riders use the motorway, although the section is the motorway only for cars, buses, trucks and motorcycles. Local people are crossing the motorway by removing the guard rail of the center divider. The acceleration lane from Yen Phone Industry Park is not long enough. Countermeasures at the hardware side, such as construction of an additional culvert for pedestrians and an intersection at the industrial park, are necessary, while awareness of local people and drivers on traffic safety must be raised.

(2) Early completion of temporary part of the motorway

The temporary part of the motorway at Noi Bai is to be completed promptly. The temporary part is closed now, as the intersection with National Expressway No. 2 has been under construction. Necessary measures to widen the temporary part should be taken soon, as the temporary part is going to be re-opened after the completion of the intersection. At least, even when the necessary budget is not secured, emergency measures should be taken for the gabion structure of the temporary bridge.

(3) Countermeasures for road sinking

As mentioned above in "Sustainability", some countermeasures have already been introduced for the sunken parts. Research on effective measures to prevent sinking should be conducted among the stakeholders, as road sinking is expected to be continuously occurred. Necessary budget should be secured to conduct countermeasures for road sinking from now on, assuming that the sunk will not stop.

(4) Countermeasures for over-weighted trucks

As mentioned above in “Sustainability”, over-weighted truck is a major cause of road deterioration. The DRVN should study lessons learned from the pilot checkpoints and share the result of the study within the Ministry early next year as planned. Then, the detailed plan for the installation of checkpoints is to be formulated.

4.2.2 Recommendations to JICA

(1) Confirming the effectiveness of project activities under the “Northern Viet Nam National Roads Traffic Safety Improvement Project” and dissemination.

As mentioned in “3.3 Effectiveness,” the activities implemented under the JICA project “Northern Viet Nam National Roads Traffic Safety Improvement Project” may contribute to decreasing traffic accidents along the highway No. 18 in Hai Doung Province. The effectiveness of project activities should be examined, although the project is still ongoing. Lessons learned from the project could be applied to other parts of National Highway No. 18 and other highways as good practices.

4.3 Lessons Learned

If the checkpoint for over-weighted trucks is installed without considering regional traffic flows, the traffic flow may be negatively affected in the region, as some trucks may bypass the checkpoints. The pilot checkpoint along National Highway No. 18 might have affected the achievement of the project, as the traffic volume was distorted by the traffic bypassing the checkpoint. It is necessary to decide the location of the checkpoints in consideration of the regional road network to avoid disturbing smooth logistics and distribution of goods in the region.

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1) Project Outputs	Construction of two-lane Motorway in Noi Bai-Bach Ninh section	Construction of four-lane motorway
	Road improvement in Bach Ninh section and Bieu Nghi-Cua Ong section	As planned, however, some parts of the road were widened to four lanes. Culverts were built instead of bridges.
	Construction of Pha Lay Bridge	As planned
	Construction of four toll gates and buildings for road management	Construction of two toll gates and three buildings for road management
	Construction of the approach and access roads to Bai Chay Bridge.	As planned
		Additional outputs (Improvement of Bieu Nghi-Pha Rung section, Construction of Cua Ong bypass, improvement of roads in Chi Linh City and Bach Ninh City, and National Highway No. 295, protection of the slope of the approach road to Bai Chay Bridge.
	Procurement of 32 types equipment	As planned
	Consulting service for National Highway No. 18 improvement project	As planned
	Consulting service for Bai Chay Bridge construction project	As Planned
		Additional consulting service (Supervision for Bai Chay Bridge construction)
2) Project Period	March 1998 – July 2002 (53 months)	Original scope March 1998 – May 2007 (111 months) Original and additional scope March 1998 – May 2008 (123 months)
3) Project Cost[36] Amount paid in foreign currency Amount paid in local currency Total Japanese ODA loan portion Exchange rate	 11,693 million yen 17,082 million yen (1,708,200 million VND) 28,775 million yen 23,449 million yen 1 VND = 0.01 yen (As of October 1997)	 7,365 million yen 17,981 million yen (2,371,919 million VND) 25,367 million yen 21,385 million yen 1 VND = 0.0076 yen (Average rate from March 1998 to July 2008)

[36] Original project cost was estimated at the appraisal time for National Highway No. 18 project phase II. Original project cost includes the consulting service for Bai Chay Bridge construction project. Actual project cost includes the consulting service for Bai Chay Bridge construction project and the construction of approach and access roads to Bai Chay Bridge.