Vietnam

National Highway No. 1 Bridge Rehabilitation Project (I)(II)

Evaluator: Vietnam-Japan Joint Evaluation Team 2007[1]
On-site Survey: December 2007

## 1. Project Profile


Project Site (National Highway No. 1)

Ngon Son Bridge (Phu Yen Province)

### 1.1 Background

National Highway No.1 (NH-1) was an important and the longest trunk road in Vietnam running across the entire country from the north to south with a total length of 2,300km. NH-1 started from Lang Son near the Chinese border in the north and ended at Ca Mau in the south of Mekong Delta area connecting the major cities of Vietnam including Hanoi, Hue, Da Nang, Nha Trang, Ho Chi Minh City (HCMC), and Can Tho. Whilst long-distance transport between Hanoi and HCMC mainly depended upon a maritime transportation route, a short and medium transportation route between the north, centre and south was accommodated through NH-1.

NH-1 crossed over many rivers and canals; more than 870 brides[2] were constructed on NH-1. Many of the bridges on NH-1 were road and railway combined bridges. However, they were badly damaged or destroyed during the Vietnam War (1945-1979). The temporary repair or restoration of the damaged roads and bridges on NH-1 had been carried out at many sections from time to time[3], but the deterioration of the road and bridges came to be serious because they already exceeded their expected lifetimes. The weight limit of bridges for vehicles was enforced at many bridges, and also the narrow and single carriageways of bridges could not accommodate the increasing traffic demands.

[1] The Vietnam-Japan Joint Evaluation Team 2007 consisted of the three Working Groups each of which evaluated different projects. This project was evaluated by the Highway No.1 Group joined by the following members: Le Van Chien, Duong An Hai (PMU18); Cao Manh Cuong, Nguyen Hoang Luat, Le Van Khien (Ministry of Planning and Investment); Nguyen Thanh Hang (Ministry of Transport); Mai The Cuong (National Economic University); Keishi Miyazaki (OPMAC).

[2] The bridges on NH-1 starts from Dong Dang Bridge (Km 2+670) and ends at Ong Trinh Bridge (Km 2,296+297).

[3] One-third of bridges in the northern part were temporary ones and half of bridges in the southern part were also temporary ones.

The issue of aged and weak bridges was a serious bottleneck for safe and smooth road traffic flow on NH-1. Therefore, rehabilitation of the existing old bridges on NH-1 was urgently required.

1.2 Objective

The objective of the project was to increase the traffic efficiency of the section with the high growth of traffic volume by rehabilitation and/or replacement of the selected bridges on the National Highway No. 1.

Logical Framework Applied for Ex-Post Evaluation

| | |
|---|---|
| Goal | 1. Improvement of efficiency in goods and passenger circulation in Vietnam<br>2. Regional development<br>3. Improvement of people's living standards |
| Purpose | Increase in the traffic efficiency on the section with the high growth of traffic volume |
| Outcomes | 1. Increase in traffic volume<br>2. Reduction in travel time<br>3. Increase in travel speed |
| Outputs | 1. Rehabilitation and replacement of 63 bridges on NH-1 (Lang Song-Hanoi: 14 bridges, Hanoi-Vinh: 6 bridges & 2 flyovers, Dong Ha-Nha Trang: 10 bridges, Nha Trang-HCMC: 14 bridges, HCMC-Can Tho: 19 bridges)<br>2. Consulting service |
| Inputs | Project Period: January 1994 – February 2003 (Plan)<br>Project Cost: 42,081 Million Yen (Plan) |

1.3 Borrower/Executing Agency

Government of Socialist Republic of Vietnam/Ministry of Transport (MOT), Project Management Unit 18 (PMU18).

1.4 Outline of Loan Agreement

| | Phase I-1 (VNI-5) | Phase I-2 (VNII-5) | Phase I-3 (VNIII-5) | Phase II-1 (VNIII-7) | Phase II-2 (VNIV-7) | Phase II-3 (VNVI-7) |
|---|---|---|---|---|---|---|
| Loan Amount / Disbursed Amount | 3,870 Mill. Yen/ 3,811 Mill. Yen | 2,859 Mill. Yen/ 2,841 Mill. Yen | 8,808 Mill. Yen/ 7,890 Mill. Yen | 4,907 Mill. Yen/ 4,842 Mill. Yen | 2,239 Mill. Yen/ 1,410 Mill. Yen | 13,170 Mill. Yen/ 10,767Mill. Yen |
| Date of Exchange of Notes / Date of Loan Agreement | 28 Jan. 1994 / 28 Jan. 1994 | 18 Apr. 1995 / 18 Apr. 1995 | 29 Mar. 1996 / 29 Mar. 1996 | 29 Mar. 1996 / 29 Mar. 1996 | 26 Mar. 1997 / 26 Mar. 1997 | 30 Mar. 1999 / 30 Mar. 1999 |
| Terms and Conditions<br>- Interest Rate<br>- Repayment Period (Grace Period)<br>- Procurement | 1.0% p.a.<br>30 years<br>(10 years)<br>Partially Untied | 1.8% p.a.<br>30 years<br>(10 years)<br>Partially Untied | 2.3% p.a.<br>30 years<br>(10 years)<br>Partially Untied | 2.3% p.a.<br>30 years<br>(10 years)<br>Partially Untied | 2.3% p.a.<br>30 years<br>(10 years)<br>General Untied | 1.8% p.a.<br>30 years<br>(10 years)<br>General Untied |
| Final Disbursement Date | 08 Feb. 1999 | 14 Sep. 2000 | 26 Jul. 2005 | 26 Jul. 2002 | 12 Sep. 2002 | 23 Oct. 2006 |
| Main Contractor | • J/V of SumitomoCo. (Japan) - Thang Long Construction Corporation (Vietnam)<br>• J/V of Tecnosviluppo SPA (Italy) - Civil Engineering Construction Corporation No.8 (Vietnam)<br>• J/V of Samwhan Corporation (South Korea) - Civil Engineering Construction Corporation | | | • J/V of Thang Long Construction Corporation (Vietnam) - Civil Engineering Construction Corporation No.1 (Vietnam)<br>• J/V of Samwhan Corporation (South Korea) – Civil Engineering Construction Corporation No. 6 (Vietnam)<br>• J/V of Thang Long Construction Corporation | | |

| | | |
|---|---|---|
| | No.4 (Vietnam)<br>• J/V of NECCO (Vietnam) - Song Da Construction Corporation (Vietnam) | (Vietnam) - Civil Engineering Construction Corporation No.4 (Vietnam) - Civil Engineering Construction Corporation No.5 (Vietnam)<br>• J/V of Civil Engineering Construction Corporation No.1 (Vietnam) - Civil Engineering Construction Corporation No.5 (Vietnam)<br>• China State Construction Engineering Corporation (China)<br>• Civil Engineering Construction Corporation No.1 (Vietnam) |
| Consulting Services | J/V of Pacific Consultants International (Japan) - Nippon Koei Co. Ltd. (Japan) - Asia Pacific Engineering Consultants (Vietnam) | • J/V of Pacific Consultants International (Japan) - Chodai Co., Ltd. (Japan) – Japan Overseas Consultants Co., Ltd. (Japan) - Asia Pacific Engineering Consultants (Vietnam)<br>• Japan Bridge and Structure Institute Inc. (Japan) |
| Feasibility Study | March 1993, ADB / Transport Engineering Design Institute (TEDI)<br>October 1995, JBIC SAPROF Team | |

## 2. Results of Evaluation (Rating: B)

### 2.1 Relevance (Rating: a)

The project was planned and implemented in a way that was consistent with Vietnam's development policies/programs and needs both at the times of appraisal and ex-post evaluation. Therefore, relevance of this project is high.

#### 2.1.1 Consistency with Vietnamese Development Policies

The project objective is in the same direction as those of Vietnam's Socio-Economic Development Plans and road development strategies of both project appraisal and ex-post evaluation periods, as well as with the Comprehensive Poverty Reduction and Growth Strategy (CPRGS). The road sector has been playing a leading role for passenger and cargo transport among all transport modes in Vietnam both in 1994 (at the project appraisal) and 2006 (after project completion) (Table 1).

Table 1: Volume of Passenger and Cargo Transport by Mode of Transport

| **Passenger** | 1994 | | | | 2006 | | | |
|---|---|---|---|---|---|---|---|---|
| | mill. person | % | mill. person-km | % | mill. person-km | % | mill. person | % |
| Rail | 8 | 2 | 1,796 | 8 | 12 | 1 | 4327 | 7 |
| Road | 414 | 79 | 15,309 | 72 | 1188 | 86 | 38,041 | 65 |
| Inland Waterway | 101 | 19 | 1,566 | 7 | 177 | 13 | 3,560 | 6 |
| Air | 2 | 0 | 2,371 | 11 | 7 | 1 | 12,575 | 21 |
| Total | 525 | 100 | 21,248 | 99 | 1387 | 100 | 58,709 | 100 |

| **Cargo** | 1994 | | | | 2006 | | | |
|---|---|---|---|---|---|---|---|---|
| | 1,000 ton | % | mill. ton-km | % | 1,000 ton | % | mill. ton-km | % |
| Rail | 4,000 | 3 | 1,370 | 6 | 3,457 | 4 | 9,202 | 3 |
| Road | 82,069 | 68 | 4,066 | 17 | 12,373 | 14 | 230,963 | 66 |
| Inland Water | 27,780 | 23 | 2,801 | 12 | 5,064 | 6 | 74,253 | 21 |
| Maritime | 6,462 | 5 | 15,800 | 66 | 67,453 | 76 | 35,856 | 10 |
| Air | 21 | 0 | 36 | 0 | 270 | 0 | 119 | 0 |
| Total | 120,331 | 100 | 24,073 | 100 | 88,617 | 100 | 350,393 | 100 |

Source: GSO.
Note: 2006 data is an estimation by GSO.

Furthermore, this bridge rehabilitation project on NH-1 was coordinated with the road

rehabilitation projects on NH-1 co-financed by World Bank[4] and Asian Development Bank (ADB)[5], which implies that World Bank and ADB put the priority for rehabilitation of the road and bridges in the entire section of NH-1.

Throughout those plans/strategies, development of national arterial road network is given a high priority for poverty reduction and economic development.

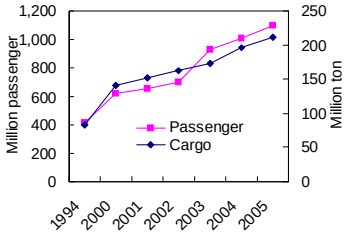
2.1.2 Consistency with Needs

High needs for rehabilitation of bridges on NH-1 are seen in the road safety issue as well as increasing traffic demand both at appraisal and ex-post evaluation.

At the time of appraisal, most of the existing bridges on NH-1 already exceeded the expected lifetime and their physical conditions were seriously poor due to a lack of maintenance as well as rehabilitation works, which threatened the road safety. Therefore, rehabilitation of the existing old bridges on NH-1 was urgently required. Even now, there still exist old and weak bridges on NH-1, there is a demand for their rehabilitation and strengthening to secure the road safety on NH-1[6]. Currently, JBIC ODA loan project "The Third NH-1 Rehabilitation Project" has been under implementation for rehabilitation of 17 bridges between Can Tho and Ca Mao.

Road transportation demand in Vietnam in general is increasing. The total length of national road increased by 41% from 10,800km in 1992 to 15,202km in 2004. The annual growth rate of road transportation volume of the entire country is steadily increasing for both passenger and cargo (Figure 1). The traffic volume on NH-1 is increasing as well[7], a new expressway project "North-South Expressway Project"[8] connecting Hanoi and Ho Chi Minh City is being planned and some sections are under implementation[9].

Figure 1: Transportation Volume of Entire Vietnam




Source: GSO

In addition, from the viewpoint of regional economic development, the role of NH-1 has

[4] World Bank (IDA) financed the road rehabilitation projects for the sections between (i) Hanoi-Vinh (276km) and HCMC-Can Tho (151km) through the Highway Rehabilitation Project (1993-2003), and (ii) Vinh-Dong Ha (293km) and Dong Ha-Quang Ngai (289km) through the Second Highway Rehabilitation Project (1997-2003).

[5] ADB financed the road rehabilitation projects for the sections between (i) Nha Trang-HCMC (434km) by the Road Improvement Project (1994-2002), (ii) Lang Song-Hanoi (163km) by the Second Road Improvement Project (1996-2003), and (iii) Quang Ngai-Nha Trang (400km) by the Third Road Improvement Project (1996-2005).

[6] According to PMU18, there are 874 bridges on NH-1. Even after the implementation of this project, there still exist 61 old and weak high-prioritized bridges on NH-1 requiring replacement or upgrading.

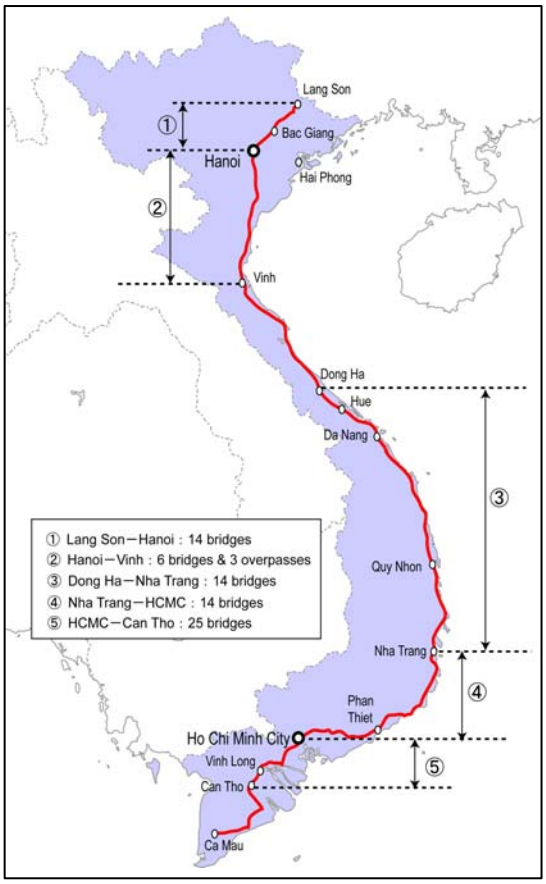
[7] See "3.3 Effectiveness" for actual figures of traffic volume on NH-1.

[8] It is based on Master Plan of Expressway Network Development of Vietnam until 2020.

[9] The HCMC-Trung Luong section is under construction, and the Long Thanh-Dau Giay section and Long Thanh-Vung Tau section were at the first technical design stage.

become more and more important since NH-1 is the most important national arterial road in Vietnam connecting major cities as well as strategic seaports from the north to the south of the country.

Figure 2: Project Site Map




2.2 Efficiency (Rating: a)

2.2.1 Outputs

Planned outputs (i.e. rehabilitation of 63 bridges and construction of two overpasses) were all completed and additional outputs (i.e. rehabilitation of additional 10 bridges including 43.9km of connecting roads, construction of additional one overpass (flyover), two bypass roads, five feeder roads, and two provincial roads) were implemented using the residual project funds (Table 2). Also the work volume of consulting services was increased by 5,491 M/M in comparison with 3,629 M/M in the plan and 9,120 M/M in actual implementation, which was around 2.5 times bigger (251%) than the original plan.

Table 2: Comparison of Planned and Actual Project Outputs

| Phase | Section | Plan | Actual |
|---|---|---|---|
| Phase I | Hanoi – Vinh | 6 bridge,<br>2 overpasses | 6 bridges (+connecting road 4.9km), 3 overpasses,<br>1 bypass road (13km), 5 feeder roads (29km) |
| | Nha Trang – HCMC | 14 bridges | 14 bridges (+connecting road 4.3km) |
| | HCMC – Can Tho | 19 bridges | 25 bridges (+connecting road 9.8km) |
| Phase II-1 | Bac Giang – Hanoi | 4 bridges | 4 bridges (+connecting road 2.7km) |
| | Dong Ha – Nha Trang | 5 bridges | 5 bridges (+connecting road 3.4km) |
| Phase II-2 | Lang Son – Bac Giang | 10 bridges | 10 bridges (+connecting road 2.5km) |
| Phase II-3 | Dong Ha – Nha Trang | 5 bridges | 9 bridges (+connecting road 16.3km),<br>1 bypass road (5.5km), 2 provincial roads (4.2km) |
| Total | All section | 63 bridges,<br>2 overpasses | 73 bridges(+connecting road 43.9km), 3 overpasses,<br>2 bypass road (18.5km), 5 feeder roads (29km),<br>2 provincial roads (4.2km) |

The main reasons for the additional outputs are: (i) using the residual project fund rehabilitation of 10 bridges including connecting roads, construction of one overpass and two bypass roads was newly added in the project scope based on the proposals and requests by the local governments. Also construction of five feeder roads was added to supplement the World Bank co-financed projects. (ii) Due to project scope expansion and supplement works, the actual work volume of consulting service was increased by 5,491 M/M. But about 70% of the additional 5,491 M/M (=3,931 M/M) was attributed to the additional work volume of local junior engineers and supporting staff who were

under-estimated at the planning stage[10]. Furthermore, the original estimation in plan underestimated adequate work volumes for supervision of construction which made up the majority of consulting services in practice.

### 2.2.2 Project Period

The project was delayed by three years two months which was 131% of planned duration (Table 3). But looking at the comparison of planned and actual project duration spent for realization of the original project outputs, the actual duration was same as the planned one (100%). The main reasons for the gap are: (i) prolonged land acquisition process; (ii) slow procedures of the Vietnamese government's project implementation and authorization; (iii) deterioration of the financial capacity of some Vietnamese contractors; and (iv) bad weather and natural disasters particularly at coastal areas.

Table 3: Comparison of Planned and Actual Project Period

| Phase | Plan | Actual |
|---|---|---|
| Phase I | January 1994 – December 1998 (5 years) | January 1994 – December 2005 (12 years) |
| Phase II-1 | March 1996 – April 2000 (4 years 2 months) | March 1996 – December 2000 (4 years 10 months) |
| Phase II-2 | March 1997 – March 2000 (3 year 1 months) | March 1997 – December 2000 (3 years 10 months) |
| Phase II-3 | March 1999 – February 2003 (4 years) | March 1999 – December 2005 (6 years 10 months) |
| Total duration | January 1994 – February 2003 (9 years 2 months) | January 1994 – December 2005 (12 years) |

Note:
1) Planned project period is based on the Phase II-3 appraisal.
2) The project period is assumed from the signing L/A to the completion of civil works.

### 2.2.3 Project Cost

The actual project cost was 35,627 million JPY against the planned cost of 42,081 million JPY, which was 85% of the planned project cost (Table 4). The main reasons for this cost saving are: (i) cost saving for construction works as a result of competitive bidding; (ii) relatively high estimation of construction unit price because this project was one of the first JBIC large-scale infrastructure projects in Vietnam; (iii) the actual cost for land acquisition was lower than the estimated cost; (iv) JPY has appreciated against VND, which led to the decrease of cost expressed in JPY; and (v) cost saving for administration cost by efficient budget use.

Table 4: Comparison of Planned and Actual Project Cost

| | **Plan** (million JPY) | **Actual** (million JPY) |
|---|---|---|
| 1. Construction | 28,023.3 | 26,746.1 |
| 2. Price escalation | 1,543.7 | 227.1 |
| 3. Physical contingency | 2,955.5 | 1,378.7 |
| 4. Consulting Service | 3,000.4 | 4,994.9 |
| 5. Land acquisition and resettlement | 2,991.2 | 2,102.1 |
| 6. Administration | 1,131.4 | 154.1 |
| 7. Tax & duties | 2,435.6 | 24.0 |
| 8. Interest during construction | 698.0 | 0.0 |
| Total | 42,081.1 | 35,627.0 |

Note:
1) Planned project cost is based on the Phase II-3 appraisal.
2) Exchange rate used for planned cost: 1VND=0.01JPY (1994)
3) Exchange rate used for actual cost: 1VND=0.008JPY (1994-2006 average)

[10] If the work volume for local junior engineers and supporting staff is ignored and only work volumes for international and Vietnamese engineers between the plan and actual implementation are compared, the actual work volume is 3,850 M/M against planned work volume at 2,291 M/M; hence, the gap is 1,559 M/M (168% of the plan).

Pictures of Selected Target Bridges on NH-1 (Before and After the Project Implementation)

Old and New **Thach Han Bridge** (Quang Tri Province)

Old and New **Cao Lau Bridge** (Quang Nam Province)

Old and New **Tra Khuc Bridge** (Quang Ngai Province)

2.3 Effectiveness (Rating: b)

The implementation of the project realized the expected outcomes mostly as planned, but the expected traffic volume was not much achieved. Therefore, the effectiveness of the project can be considered moderate.

2.3.1 Degree of Achievement of "Increase in Traffic Volume"

Although there is a difficulty in comparing the estimated and actual traffic volume exactly because the location of traffic counting stations of each section at the time of appraisal cannot be identified, the comparison of estimated and actual traffic volume in 2006 indicates that actual traffic volume has not yet increased as anticipated at many stations (Table 6). On the one hand, the actual traffic volume at Dong Ha-Hue section fully met its target in 2006 (168% of achievement) because the section is located at the border gate through Road No.9 which attracts

Table 5: Estimated Traffic Volume for Each Section (unit: PCU/day)

| | 2000 | 2006* | 2010 | 2020 |
|---|---|---|---|---|
| Dong Ha - Hue | 3,941 | 6,701 | 8,836 | 23,123 |
| Hue - Da Nang | 4,457 | 7,004 | 7,767 | 20,108 |
| Da Nang - Quy Nhon | 19,300 | 27,517 | 22,550 | 62,957 |
| Quy Nhon - Nha Trang | 13,941 | 20,796 | 21,266 | 52,878 |

Source: JBIC appraisal document.

* Estimated traffic volume in 2006 is projected using the average growth rate between 2000 and 2020 for each section: 9.3% (Donag Ha-Hue), 7.8% (Hue-Da Nang), 6.1% (Da Nang-Nha Trang), and 6.9% (Quy Nhon-Nha Trang)

** Estimated traffic volume data does not indicate the location of station.

Table 6: Actual Traffic Volume at Each Station (unit: PCU)

| Section | Station | Km | 2006 | Achieve-ment |
|---|---|---|---|---|
| Dong Ha - Hue | Dong ha | 765 | 11,241 | 168% |
| Hue - Da Nang | Phu bai | 838 | 6,012 | 86% |
| | Deo Hai van | 908 | 1,743 | 25% |
| | Nga tu Hoa Cam | 930 | 21,011 | 300% |
| Da Nang - Quy Nhon | Que Son | 965 | 12,580 | 46% |
| | Tam Anh | 1,002 | 9,417 | 34% |
| | Binh Long | 1,040 | 10,978 | 40% |
| | La Ha | 1,062 | 17,019 | 62% |
| | Duc Pho | 1,098 | 6,440 | 23% |
| | Nga ba Bong Son | 1,144 | 6,848 | 25% |
| | Phu Cat | 1,189 | 7,671 | 28% |
| Quy Nhon - Nha Trang | Phu Tai | 1,221 | 12,234 | 59% |
| | Xuan Loc | 1,256 | 6,345 | 31% |
| | Tuy An | 1,317 | 8,348 | 40% |

Source: VRA

Note: PCU is calculated by the joint evaluation team based on the traffic volume data of VRA.

more transit vehicles. Likewise the actual traffic volume at two stations of Hue-Da Nang section indicates a good performance (86% and 300% of achievement). On the other hand, the majority of other sections could not fully reach their targets (23-62% of achievement). Generally, road traffic volume on NH-1 has been growing, but its growth rate is lower than at the estimation at the planning stage.

The possible reason for such low performance of actual traffic volume in 2006 can be explained on the grounds that the estimated traffic volume at the time of project preparation was relatively optimistic. It was estimated based on the assumption that an annual average growth rate of traffic volume would be from 6.1% to 9.3% during the period from 2000 and 2020, but this assumption seems to be slightly ambitious[11]. At the same time, this result has some reservations because there is a gap in the locations of traffic counting stations between the benchmark data (i.e. estimated traffic volume at appraisal) and the actual traffic volume data provided by Vietnam Road Administration (VRA). If the comparison of traffic volume data provided by the same counting method at the same station is possible, deeper analysis on the achievements could be done.

### 2.3.2 Degree of Achievement of "Reduction in Travel Time" and "Increase in Travel Speed"

Travel time was reduced by almost half and travel speed (velocity) was increased by about two times (Table 7). For example, the travel time between Lang Son and Hanoi used to be five hours with its average travel speed of 34km/h, but after the project implementation, the travel time was reduced to 2.5 hours with its average travel speed of 68km/h. It was also confirmed by the beneficiary survey of the local transporters and the local governments that they well realized the reduction of travel time coupled with the increase in travel speed on NH-1. These project outcomes are a joint effect of rehabilitation of bridge and road projects on NH-1.

Table 7: Reduction in Travel Time and Increase in Travel Speed

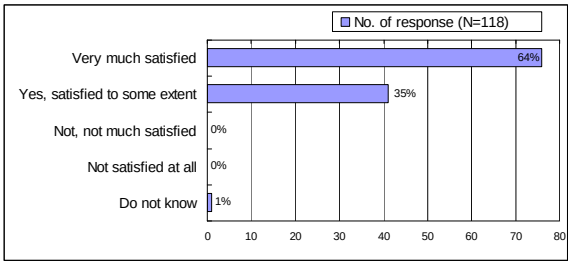
| Section on NH-1 | Before project | | After project | |
|---|---|---|---|---|
| | Travel time | Travel speed | Travel time | Travel speed |
| Lang Song-Hanoi (170km) | 5h | 34km/h | 2.5h | 68km/h |
| Dong Ha-Nha Trang (630km) | 21h | 30km/h | 10h | 63km/h |
| Nha Trang-HCMC (550km) | 18h | 31km/h | 9h | 62km/h |

Source: PMU18

### 2.3.3. Satisfaction of Beneficiaries

According the result of satisfaction survey of local residents living along NH-1, 64% of respondents (76 respondents) rated "Very much satisfied" and 35% of respondents (41 respondents) answered "Yes, satisfied to some extent." The satisfaction level of local residents was very high (Figure 2). Overall, 99% of

Figure 2: Satisfaction of Local Resident along NH-1




[11] The average growth rate of 6.1-9.3% may be applicable only at the first stage; normally the growth rate tends to be reduced gradually after that. Considering the cases of other road and bridge projects in Vietnam, the annual average growth rate of traffic volume can be reasonably estimated at 5-6%.

interviewed local residents were satisfied with the improvement of roads and bridges on NH-1, which suggests that the project met the local needs.

2.3.4 Economic Internal Rate of Return (EIRR)

In the project appraisal, EIRR of the project as calculated for each section was: (i) Lang Son-Bac Ginag: 31%, (ii) Bac Giang-Hanoi: 32%, (iii) Hanoi-Vinh: 15.9%, (iv) Dong Ha-Nha Trang: 17.2%, (v) Nha Trang-HCMC: 26%, and HCMC-Can Tho: 29.6% (Table 8). The benefits included savings from reduction in vehicle operation cost (VOC) and travel time, construction cost for temporally bridges, and economic losses due to falls of bridges. The cost included project cost and O&M cost of the bridges. Project life was assumed at 25 years. In the ex-post evaluation, EIRR was re-calculated using the same unit cost for benefit items applying the actual cost and some adjustments of preconditions. The result of EIRR re-calculation for each section is shown in Table 8. The re-calculated EIRR for four sections such as Lang Son-Bac Ginag, Bac Giang-Hanoi, Hanoi-Vinh, Nha Trang-HCMC is higher than the plan, but the re-calculated EIRR for the other two sections at Dong Ha-Nha Trang and HCMC-Can Tho is lower. Also EIRR for entire section (from Lang Son to Can Tho) was exercised and was 20.3%.

Table 8: Re-calculation of EIRR

| Section | Plan | Re-calculation |
|---|---|---|
| Lang Son-Bac Giang | 31.0% | 36.6% |
| Bac Giang-Hanoi | 32.0% | 35.8% |
| Hanoi-Vinh | 15.9% | 36.1% |
| Dong Ha-Nha Trang | 17.2% | 12.3% |
| Nha Trang-HCMC | 26.0% | 60.3% |
| HCMC-Can Tho | 29.6% | 16.0% |
| Entire Section | N.A. | 20.3% |

The possible reasons for such gaps may relate to: (i) adjustment for an annual average growth rate of VOC and time saving; (ii) adjustment for O&M costs; (iii) adjustment for allocation of project cost for each section; (iv) reduction of project cost; (v) increase in numbers of bridges; and (vi) prolonged and delay of the project period, which is favorable to increase the benefits.

2.4 Impact

The rehabilitation of bridges on NH-1 coupled with its road improvement supported industrialization of provinces along NH-1 and contributed to economic development and poverty reduction, whilst causing some negative changes to the local residents and the areas along NH-1, such as an increase in flood damage, and adverse effects on the living standards of the resettled households caused by the project. Also the local residents perceived the increase of traffic accidents along NH-1, and the project might have some linkage to the increase of traffic accidents as a part of NH-1 road improvement project.

2.4.1 Impact on Improvement of Efficiency in Goods and Passenger Circulation in Vietnam

The impact on improvement of efficiency in goods and passenger circulation in Vietnam is positive. In overall traffic volume on NH-1 shows upward trends. All of interviewed six provincial governments[12] perceived that commodity and passenger transportation in

[12] The six interviewed provinces are Bac Giang Province, Quang Nam Province, Khanh Hoa Province, Binh Dinh Province, Binh Thuan Province and Ho Chi Minh City. The outline of the beneficiary survey is

inter-province and nation-wide was improved. Many of interviewed companies [13] recognized that logistics and distribution of goods were upgraded due to shortening of travel time. For example, the manufacturing companies in Bac Giang Province suggested that NH-1 helped them to expand their distribution networks. Also improvement of convenience in transport including promotion of flow of goods was listed as one of the most important changes in the beneficiary survey to the local residents living near NH-1 [14].

2.4.2 Impact on Regional Development along NH-1

In general, regional development is positive in the provinces along NH-1 in the last two decades. For instance, the average Provincial GDP in 27 provinces [15] along NH-1 from Lang Son to Can Tho was 7-13% during 2000-2003. The average annual growth rate of industrial outputs in the provinces was 15-41%, and the average annual growth rate of agricultural outputs in the provinces is 2-7% during 1995-2006 except urban areas like Da Nang (-0.1%), Ho Chi Minh City (1.4%) and Can Tho (-4.0%). The cargo handling volume at major sea ports along NH-1 has been expanded during 2003-2006 (Table 9). One of the outstanding changes is a rapid industrial development in the region. At present, a total of 55 industrial parks are in operation, and another 34 industrial parks are under preparation or construction in 27 provinces along NH-1 from Lang Son to Can Tho.

Table 9: Volume of Cargo Handling at Major Sea Ports along NH-1

(unit: 1,000 ton)

| Port Region | 2003 | 2004 | 2005 | 2006 |
|---|---|---|---|---|
| Hai Phong | 12,732 | 13,207 | 14,043 | 17,207 |
| Saigon | 44,599 | 47,888 | 53,299 | 59,247 |
| Danang | 4,756 | 4,958 | 4,734 | 5,093 |
| Nghe An | 849 | 1,018 | 1,375 | 1,310 |
| Quy Nhon | 2,844 | 3,402 | 3,523 | 3,965 |
| Nha Trang | 3,464 | 4,189 | 4,037 | 3,769 |
| Can Tho | 676 | 1,010 | 1,365 | 1,183 |
| Quang Ninh | 14,634, | 19,387 | 22,717 | 28,100 |
| Total | 84,556 | 95,060 | 105,094 | 119,874 |

Source: VinaMarine

The result of the beneficiary survey indicates that industrial development along NH-1 was accelerated at all interviewed six provinces. For example, in Bac Giang Province six industrial parks and six industrial clusters were developed. In Khanh Hoa Province, three industrial parks and industrial clusters as well as several factories were constructed. In Binh Dinh Province about 10 industrial clusters were developed in the last three years. In Binh Thuan Province, two industrial parks, and in HCMC six industrial parks were established.

Tourist development in the south central coastal area was promoted and more tourists became to visit the area via NH-1 coupled with bridge rehabilitation of Hanoi-HCMC

provided in BOX: Overview of the Beneficiary Survey.

[13] A total of 12 companies and organizations were interviewed in Bac Giang Province, Da Nang City, Binh Dinh Province, Khanh Hoa Province, Binh Thuan Province and Ho Chi Minh City.

[14] A total of 118 local residents along NH-1 were surveyed through Focus Group (FG) methodology in Bac Giang Province, Quang Binh Province, Quang Nam Province and Khanh Hoa Province.

[15] Twenty-seven provinces are: Hanoi, Bac Ninh, Ha Tay, Ha Nam, Ninh Binh, Lang Son, Bac Giang, Thanh Hoa, Nghe An, Ha Tinh, Quang Binh, Quang Tri, Thua Thien-Hue, Da Nang, Quang Nam, Quang Ngai, Binh Dinh, Phu Yen, Khanh Hoa, Ninh Thuan, Binh Thuan, Dong Nai, Ho Chi Minh City, Long An, Tien Giang, Vinh Long, Can Tho.

railway line[16] by realizing reduction of travel time between HCMC and the south central costal areas such as Khanh Hoa Province (including Nha Trang city) and Binh Thuan Province. The foreign direct investment (FDI) to the tourism sector in Binh Thuan Province expanded from 10 million USD in 2005 to 100 million USD in 2007.

Also, the beneficiary survey result from companies suggests that the project made favorable changes to their business activities. They benefitted from reduction of the transport costs by savings in vehicle operation costs, and their import-export activities were promoted by having better connections to sea ports. Such positive changes are shared with local residents, in that "increase in business opportunities" was perceived by majority of people.

These remarkable achievements are supported by many factors such as the government economic and industrial policies and guidance including FID promotion and active public investment for the economic and social infrastructure sector including road networks, sea ports, electricity, telecommunication, and so on. Investment in national highway networks might be one active and significant contribution to the achievements. It is strongly supported by the interview results at the six provinces.

2.4.3 Impact on Improvement of People's Living Standards

Twenty-seven provinces along NH-1 are located at the Red Rive delta, north central coast, south central coast, and southeast regions. Although poverty rate by each province is not available, all of the regions in Vietnam show the improvement in the poverty rate between 2002 and 2004. Average income per capita in Vietnam as well as by region was also increased. The result of the beneficiary survey indicates that the local residents considered "improvement of social and economic status of the people and their communities" to be one of the most important changes after improvement of NH-1. It can be added that the six interviewed provincial governments reported that their economic conditions and people's living standards were improved.

Table 10: Poverty Rate

(Unit: %)

| | 2002 | 2004 |
|---|---|---|
| Whole Country | 28.9 | 19.5 |
| By region | | |
| Red River Delta | 22.4 | 12.1 |
| North East | 38.4 | 29.4 |
| North West | 68.0 | 58.6 |
| North Central Coast | 43.9 | 31.9 |
| South Central Coast | 25.2 | 19.0 |
| Central Highlands | 51.8 | 33.1 |
| South East | 10.6 | 5.4 |
| Mekong River Delta | 23.4 | 19.5 |

Source: General Statistic Office (GSO)

Table 11: Average Income per Capita

(unit: 1,000 VND)

| | 1999 | 2002 | 2004 |
|---|---|---|---|
| Whole Country | 295.0 | 356.1 | 484.4 |
| By region | | | |
| Red River Delta | 280.0 | 353.1 | 488.2 |
| North East | 210.0 | 268.8 | 379.9 |
| North West | n.a. | 197.0 | 265.7 |
| North Central Coast | 212.4 | 235.4 | 317.1 |
| South Central Coast | 252.8 | 305.8 | 414.9 |
| Central Highlands | 344.7 | 244.0 | 390.2 |
| South East | 527.8 | 619.7 | 833.0 |
| Mekong River Delta | 342.1 | 371.3 | 471.1 |

Source: General Statistic Office (GSO)
Note: Current price.

[16] 19 railway bridges between Hanoi and HCMC were rehabilitated by JBIC's ODA loan project "Hanoi-Ho Chi Minh City Railway Bridge Rehabilitation Project (1)(2)(3) (1994-2005)," which enabled shortening the travel time between Hanoi and HCMC.

2.4.4 Impact on Reduction in Traffic Accidents

The number of road traffic accidents in Vietnam from 1990 to 2006 shows a downward trend after its peak in 2002 (Table 12). Although consolidated official statistical data for road traffic accidents on NH-1 is not available, the total number of traffic accidents in 27 provinces along NH-1 decreased from 8,502 in 2005 to 7,522 in 2007 [17], which shows the same tendency as the national level (Table 13).

Table 12: Road Traffic Accidents in Vietnam (1990-2006)

| Year | No. of Accidents | | No. of Fatality | | No. of Injury | |
|---|---|---|---|---|---|---|
| | No. | Growth rate(%) | No. | Growth rate(%) | No. | Growth rate(%) |
| 1990 | 5,565 | | 2,087 | | 4,468 | |
| 1991 | 6,864 | 23.3 | 2,395 | 14.8 | 6,846 | 53.2 |
| 1992 | 8,165 | 19.0 | 2,755 | 15.0 | 9,040 | 32.0 |
| 1993 | 11,678 | 43.0 | 4,350 | 57.9 | 12,590 | 39.3 |
| 1994 | 13,118 | 12.3 | 4,533 | 4.2 | 13,056 | 3.7 |
| 1995 | 15,376 | 17.2 | 5,430 | 19.8 | 16,920 | 29.6 |
| 1996 | 19,075 | 24.1 | 5,581 | 2.8 | 21,556 | 27.4 |
| 1997 | 19,159 | 0.4 | 5,680 | 1.8 | 21,905 | 1.6 |
| 1998 | 19,975 | 4.3 | 6,067 | 6.8 | 22,723 | 3.7 |
| 1999 | 20,733 | 3.8 | 6,670 | 9.9 | 23,911 | 5.2 |
| 2000 | 22,486 | 8.5 | 7,500 | 12.4 | 25,400 | 6.2 |
| 2001 | 25,040 | 11.4 | 10,477 | 39.7 | 29,188 | 14.9 |
| 2002 | 27,134 | 8.4 | 12,800 | 22.2 | 30,733 | 5.3 |
| 2003 | 19,852 | -26.8 | 11,319 | -11.6 | 20,400 | -33.6 |
| 2004 | 16,911 | -14.8 | 11,739 | 3.7 | 15,142 | -25.8 |
| 2005 | 14,141 | -16.4 | 11,184 | -4.7 | 11,760 | -22.3 |
| 2006 | 14,161 | 0.1 | 12,373 | 10.6 | 11,097 | -5.6 |

Source: National Traffic Safety Committee (NTSC)

According to the beneficiary survey results, local residents, companies and local governments along NH-1 had a common perception that road traffic accidents on NH-1 had increased. They suggested that the traffic accidents had increased because of (i) lack of traffic safety facilities such as traffic lights and crossing facilities; (ii) a mixture of high- and low-speed vehicles and motorbikes on the same line (i.e. there is no separation between high- and low-speed vehicles); and (iii) lack of safety awareness of drivers and residents, and so on. Obviously, the number of traffic accidents increased in comparison with the situation in 1994 and afterward.

Table 13: No. of Accidents in Provinces along NH-1

| | Province | 2005 (12M) | 2006 (12M) | 2007 (11M) |
|---|---|---|---|---|
| 1 | Lang Son | 204 | 215 | 174 |
| 2 | Bac Giang | 239 | 203 | 195 |
| 3 | Bac Ninh | 139 | 135 | 115 |
| 4 | Hanoi | 1,124 | 998 | 756 |
| 5 | Ha Tay | 397 | 434 | 292 |
| 6 | Ha Nam | 137 | 137 | 116 |
| 7 | Ninh Binh | 112 | 120 | 82 |
| 8 | Thanh Hoa | 199 | 216 | 177 |
| 9 | Nghe An | 347 | 325 | 273 |
| 10 | Ha Tinh | 173 | 203 | 171 |
| 11 | Quang Binh | 300 | 260 | 225 |
| 12 | Quang Tri | 183 | 183 | 170 |
| 13 | Thua Thien - Hue | 148 | 142 | 157 |
| 14 | Da Nang | 174 | 159 | 201 |
| 15 | Quang Nam | 351 | 363 | 302 |
| 16 | Quang Ngai | 286 | 250 | 268 |
| 17 | Binh Dinh | 285 | 323 | 298 |
| 18 | Phu Yen | 173 | 196 | 161 |
| 19 | Khanh Hoa | 219 | 199 | 223 |
| 20 | Ninh Thuan | 150 | 140 | 145 |
| 21 | Binh Thuan | 357 | 309 | 311 |
| 22 | Dong Nai | 753 | 761 | 625 |
| 23 | Ho Chi Minh City | 1,329 | 1,351 | 1,254 |
| 24 | Long An | 246 | 296 | 283 |
| 25 | Tien Giang | 238 | 250 | 271 |
| 26 | Vinh Long | 94 | 144 | 113 |
| 27 | Can Tho | 145 | 182 | 164 |
| | Total | 8,502 | 8,494 | 7,522 |

Source: National Traffic Safety Committee (NTSC)
Note: No. of traffic accidents in 2007 is for 11 months.

At the same time, the available statistic data implies that the number of traffic accidents on NH-1 went up until 2003, but after that it has been declining year by year. Since the project focused on rehabilitation of the bridges on NH-1 and the interviewed local residents lived near the road not near the bridges, a clear and direct causality between the project and increase of traffic accidents could not be identified. But if the project is regarded as a part of NH-1 rehabilitation project including road and bridge improvement,

[17] No. of traffic accidents in 2007 is for 11 months.

the project might have some influence on the increase of traffic accidents issue.

2.4.5 Negative Impacts Brought by the Project

In the beneficiary survey to local residents, negative changes such as “increase in flood damage” and “increase in damage to roads” were perceived by many local people in addition to the issue of increase in traffic accidents.

“Increase in flood damage” is often observed in the coastal areas during the rainy season. In the rainy season when the land is filled with water, the substructure of the road frequently blocks the water flow, which then dams the water like an embankment. It accelerates a flood. The interviewed local residents claimed that the damage of flood became more serious than in the previous situation. This flood problem is closely linked to the meteorological condition[18], geographical location and land development of the affected areas, but obviously the limited capacity of drainage systems of NH-1 will be one possible factor to expand the flood damage. The limited capacity of drainage systems is caused by the design problem of the drainage system[19] and the poor maintenance of the system.

Since the project scope includes construction of the approach roads to the bridges, the project might have a responsibility for this adverse impact of increase in flood damage.

Another negative impact, “increase in damage at roads” is only recognized by Focus Group (FG) at Ky Lam Commune in Dien Tho District, Quang Nam Province. They said that during bridge construction, the local roads were badly damaged by lorries and construction machines. But even after the project completion, no restoration of damaged local roads was undertaken. It can also be seen as a direct negative impact of the project.

2.4.6 Impact on Natural Environment

An environmental impact assessment (EIA) report was prepared at the time of the feasibility study, and no particular negative environmental impact was forecasted in EIA report since the project was the rehabilitation of the existing bridges. According to the executing agency and the interviewed provincial governments, generally no major negative impact on the natural environment was observed at the project sites during and after the project. Whilst many provincial governments interviewed were concerned about the increasing noise and vibration near carriageways of NH-1 as growth of road traffic volume[20]. In order to cope with this problem, planting trees along the road are done by the local governments as one of the mitigation measures.

[18] Some beneficiary suggested ideas that recent global changes as well as land development in highland areas may have an adverse effect on flooding.

[19] In flood-prone areas, the road bed was raised one meter and the embankment was strengthened. At the same time, a consideration for strengthening the drainage systems of NH-1 was made by the project during the implementation stage. But in fact, drainage capacity is still not enough to accommodate the excessive water flow during the rainy season.

[20] According to the environment monitoring data from 2000 to 2007 collected by Khanh Hoa Province, noise and dust had been increased year by year at most of the monitoring locations (total 10 locations in the province), which exceeded the national environmental standards in Vietnam.

## Box 1: Overview of Beneficiary Survey

The ex-post evaluation team (GoV and JBIC joint team) conducted the following types of beneficiary survey to the local residents, people's committees in six provinces and cities, and companies along NH-1.

**1) Focus Group (FG) of local residents**

Seven focus group (FG) meetings were conducted by participation of 118 local residents living along NH-1 in four Provinces of Bac Giang, Quang Binh, Quang Nam and Khanh Hoa.

- Discussion on the key question, "How did the improvement of NH-1 change your life?" The facilitators (research assistants) asked each participant to write down any response to the key question on a piece of paper, and then to discuss it with other group members. All participants provided various answers, both positive and negative.
- The results of ranking (vote) on the most important changes. The facilitators then asked each participant to vote on one, two or three most important "changes." The changes that collected more votes than others were: (i) improvement of convenience in transport; (ii) improvement of social and economic status of the people and their communities; (iii) increase in business opportunities; (iv) increase in traffic accidents; (v) increase in flood damage; and (vi) improvement of landscape and scenery near the bridges and roads. The increase in damage at local roads caused during the construction period is listed as one of the major changes, but it was only recognized in FG at Ky Lam Commune in Dien Tho District, Quang Nam Province.
- Satisfaction survey. The facilitators delivered a small piece of paper with only one question on a five-point scale: "How are you satisfied with the new NH-1?" The results are shown in Figure 2.

Focus group of local residents along NH-1 in Dong Hoi Province

(unit: no. of vote)

| Major response on the most important changes | (1) | (2) | (3) | (4) | (5) | (6) | (7) | Total |
|---|---|---|---|---|---|---|---|---|
| 1 Improvement of convenience in transport | 22 | 27 | 7 | 7 | 16 | 10 | 21 | 110 |
| 2 Improvement of socio-economic status | 17 | 27 | | 7 | | 10 | 21 | 82 |
| 3 Increase in business opportunities | 17 | | | | | 10 | 21 | 48 |
| 4 Increase in traffic accidents | 2 | | | 5 | 14 | | 18 | 39 |
| 5 Increased of flood damage | 10 | 7 | | 7 | 4 | | 3 | 31 |
| 6 Increase in damage at local roads | | | 24 | | | | | 24 |
| 7 Improvement of landscape | | 6 | 1 | 2 | 5 | 3 | | 17 |

Note: (1) Quan Hau Town, Quang Ninh District, Quang Binh Province; (2) Luong Ninh Commune, Quang Ninh District, Quang Binh Province; (3) Ky Lam Commune, Dien Tho District, Quang Nam Province; (4) Duy Phuoc Commune, Duy Xuyen District, Quang Nam Province; (5) Dien Khanh Town, Nha Trang Province; (6) Ninh Loc Commune, Ninh Hoa District, Nha Trang, Khanh Hoa Province.; (7) Hoang Ninh Commune, Bac Giang Province.

**2) Semi-Structured Interview (SSI) with Provincial People's Committees**

Six Provincial People's Committees of Bac Giang Province, Quang Nam Province, Khanh Hoa Province, Binh Dinh Province, Binh Thuan Province and Ho Chi Minh City were interviewed.

- All interviewed PCs perceived that the inter-province transportation of goods and services along NH-1 was improved since the project contributed to a more comprehensive road network of Vietnam and reducing traveling time. Khanh Hoa province specified that the project had created advantages for the distribution of sugar cane as an input material for sugar factories inside the province.
- All interviewed PCs acknowledged positive impacts of the project on the local economy and poverty reduction. Many industrial parks have been set up along NH-1.

Interview of Vietnam Chamber of Commerce & Industry, Da Nang

- Also the positive impact of the project on the promotion of tourism was identified by the provinces in the southeast regions such as Binh Thuan Province and Ho Chi Minh City.
- At the same time, there were claims of a problem of drainage and corrosion of river bank along NH-1.

**3) Semi-Structured Interview (SSI) with companies**

Twelve companies and organizations were interviewed: two companies in Bac Giang Province; two companies and the Vietnam Chamber of Commerce and Industry (VCCI) in Da Nang City; one company in Binh Dinh Province; two companies in Khanh Hoa Province; one company in Binh Thuan Province and three transporters in Ho Chi Minh City.

- Even though expectations of interviewed companies and transporters were high, they figured out several positive impacts of the project, including shorter traveling times, the fact that it was easier to drive (for drivers), and easier import-export activities. Other activities such as recruitment and distribution were also benefited.
- The traveling time for trucks and buses along NH-1 after project completion has been reduced by 25%-70%. Petrol consumption is less. Transport service is facilitated. One transporter in HCMC doubled its trucks in the last 10 years.

Interview of Quang Nam Province Peoples Committee

- At the same time, negative impacts were also mentioned, such as an increase in serious traffic accidents due to lack of traffic facilities and lack of awareness of drivers and people for traffic safety.

In conclusion, the evaluation team found that the tools applied were more qualitative than quantitative but successful in grasping perceptions of beneficiaries precisely within a shorter time, compared to surveys of individual respondents.

### 2.4.7 Impact of Land Acquisition and Resettlement

Actual acquired land was 304ha, which was 86ha less than the plan, but the number of affected households increased in 8,570 from 5,140 in plan to 13,710 in actual (Table 14). The possible reasons for the increase in affected households are: (i) the original number of affected households was estimated based on a preliminary study in F/S, but over the course of time from the feasibility study to the implementation of land acquisition, the target number of affected households was increased by the migration of people coming from outside the project area; (ii) expansion of the number of the target bridges and their project sites; and (iii) creation of new households by the independence of the generation of children from their parents' houses. In the resettlement area, the basic social infrastructures such as roads, electricity, water supply, and drainage system were provided.

Table 14: Land Acquisition and Resettlement

| | Plan | | | Actual | | |
|---|---|---|---|---|---|---|
| | Phase I | Phase II | total | Phase I | Phase II | total |
| Land Acquisition (ha) | 125 | 265 | 390 | 125 | 179 | 304 |
| No. of affected households | 4,765 | 375 | 5,140 | 4,765 | 8,945 | 13,710 |
| a) Completely removed | 2,239 | n.a. | 2,239 | 2,526 | 7,684 | 10.210 |
| b) Completely removed to resettlement area | 2,526 | n.a. | 2,526 | 0 | 1,769 | 1,769 |

However, a negative impact on living standards of some resettled households was observed through a filed survey. The evaluation team visited the resettlement area of Cau Lau Bridge in Quang Nam Province where 20 resettled families were living. Many interviewed residents expressed their dissatisfaction with the level of compensation received and criteria for assessment/ evaluation of their properties. There were several poor and aged households which mainly depended for their livings on self-sufficient farming which lost their livelihoods by losing their garden plots after resettlement, which made them poorer and created more hardships than before.


Resettlement area of Cau Lau Bridge in Quang Nam Province


Interview of a resident in the resettlement area

The principle of resettlement compensation is the equivalent exchange of land and compensation of property including houses[21]. Some affected households had to borrow money from the bank to build new houses at the resettlement area, since the compensation prices could not cover the entire cost of a new house. In fact, on the one hand, some households were benefitted from compensation due to an increase in land price. On the other hand, this is not the case for every affected household; some saw devaluation of their land and property, which resulted in the economic loss of property owners. There was a similar observation of this kind of adverse social impact on the affected people in the case of the NH-1 road improvement projects assisted by ADB and World Bank[22].

2.4.8 Impact on Capacity Building for Workers in Bridge Construction

Many new technologies and know-how[23] were introduced to Vietnam and about 2,500 engineers have been trained on professional jobs through the project, including overseas training for about 100 engineers.

2.5 Sustainability (Rating: b)

In general, no major problems are seen in the institutional and technical capacity of executing agency and O&M agency, but a budgetary constraint will be a risk in a long term. The present condition of the project facilities is good. Therefore, the sustainability of the project can be seen as moderate.

[21] The affected households were entitled to compensation and/or relocation assistance, depending on the severity of impact. The affected households were given the option of self-relocation to other places as they wish, or moving to the resettlement areas prepared by the project.

[22] The Project Performance Assessment Report on Highway Rehabilitation Project 1 (2004), ADB and the Implementation and Completion Report on Second Highway Rehabilitation Project (2004), World Bank.

[23] For example, the introduced technologies and know-how by the project were: (i) know-how of project management with international practices by setting up PMUs; (ii) process, procedures, technical standards of Japan and of some other countries for improvement of work quality; and (iii) construction technology of board piles with big diameters, PC girder, cable-stay bridges, PC bridges, method of design and construction of Shinso piles, and super T girder.

2.5.1 Executing Agency and Operation and Maintenance Agencies

No particular problems are seen on organizational structure for O&M agency. O&M of roads and bridges on NH-1 is handled by Vietnam Road Administration (VRA)[24] in coordination with Provincial Department of Transport (PDOT)[25]. VRA is responsible for O&M of 9,525km of the main national roads including bridges, which are managed by four Regional Road Maintenance Units (RRMU) (i.e. RRMU II, RRMU IV, RRMU V, and RRMU VII) under VRA. Under supervision of RRMU/VRA and PDOT, Road Management and Maintenance Companies (RMMC) directly conduct the maintenance works on the field. On average, 50% of bridges on NH-1 are maintained by VRA and the other 50% are taken care of by PDOT. Currently RRMC belongs to the public sector, but it is planned to be privatized by 2009.

2.5.2 O&M Technical Capacity

As long as they are maintaining the project facilities, sufficient training is provided to O&M staff. VRA regularly provides the technical training to RRMC staff at five training centers; more than 2,000 persons receive training annually. The interview results to VRA staff suggest that there is a training demand for improving worker's technical skill and knowledge particularly for large-scale bridge maintenance with new and high technologies. No particular manuals except government regulation are used. RRMU/VRA, PDOT, RRMC use "Guidelines of road maintenance."

2.5.3 Financial Status for O&M

O&M budget comes from the Treasury to VRA annually. The budget source is toll fee revenue from NH-1 and NH-5 (Table 15). According to RRMU/VRA, maintenance budget allocated only fulfills 50-60% of required budget. RRMU puts the priority on emergency maintenance under limited budget conditions. RRMU staff point out that such a maintenance budget shortfall leads to the constraints in maintenance such as a lack of maintenance equipments and computers at RRMU and RRMC levels. It will be a risk to threaten the O&M capacity of VRA in a long term perspective.

Table 15: Toll Fee Revenue and O&M Expenditures related to NH-1

(Unit: mill. VND)

| | 2004 | 2005 | 2006 |
|---|---|---|---|
| Toll fee collected from NH-1 and NH-5 | 1,044,530 | 1,114,108 | 1,152,847 |
| Contributed to Government budget | 747,257 | 804,564 | 867,680 |
| **Toll fee collected from NH-1** | **479,663** | **518,789** | **534,131** |
| Contributed to Government budget | 407,710 | 432,894 | 467,674 |
| **O&M expenditures for NH-1** | **115,947** | **115,573** | **186,145** |
| Management & regular repair | 42,943 | 51,185 | 64,838 |
| Maintenance | 73,004 | 64,388 | 121,307 |

Source: VRA

[24] VRA was re-established in 1993 by the decree No. 07/CP of the Government of Vietnam dated 30/1/1993. VRA's main tasks are: (i) to prepare policies, strategies, and master plans for the road transport sector development; (ii) to participate with MOT in the setting up of legislation regarding to transport development, (iii) to administrate the road network and maintain the national roads; and (iv) to administrate the road transport sector, road traffic, driver examination and licensing.

[25] MOT authorizes the management and maintenance of 7,807km of national roads to Provincial People's Committees (PPCs), and PPCs assign PDOTs to implement the management and maintenance of the road.

2.5.4 O&M Status

All project bridges are maintained in a good condition. According to self-assessment by VRA and a visual observation of selected bridges by the evaluation team during the field survey, a physical condition of target beiges is in good condition. However, the interviewed transporters point out that the road surface of some sections is not maintained in a good condition. The increasing traffic volume is accelerating the damage of road pavement and bridges faster than expected.

The outline of maintenance plan exercised are: (i) routine maintenance: marking, grass cutting, patching of potholes, traffic volume count at 300 stations (NH-1: 50 stations); (ii) periodic maintenance; (iii) priority maintenance: medium-scale maintenance-repair of potholes and cracks, large-scale maintenance-repair of serious damage; and (iv) emergency/special maintenance: recovery of damages by natural disasters.

Road management software which was developed by ADB and introduced to the VRA and its subordinates[26] has enhanced the efficiency of survey and reporting. The software is used for surveys, periodic reporting on road conditions and making maintenance plans. According to an operator of RRMU, data processing and reporting have become faster than before.

RRMU7 in Ho Chi Minh City
(ROSY operator)

## 3. Conclusion, Lessons Learned and Recommendations

### 3.1 Conclusion

From the findings described above, this project can be evaluated as satisfactory.

### 3.2 Lessons Learned

#### 3.2.1 Investment preparation and design

To avoid negative impacts on local residents, the feasibility study and design of a highway development project should pay attention to possible socio-economic impacts on the areas along the road.

#### 3.2.2 Land Acquisition and Resettlement

Land acquisition process should be proceeded with earlier and social consideration for affected people by land acquisition and resettlement is necessary. For this purpose, it is necessary to improve the capacity of local government.

### 3.3 Recommendations

#### 3.3.1 Traffic safety

To reduce traffic accidents, the VRA should arrange different level crossing roads and regularly propagandize traffic safety through all types of mass media. The

[26] Introduction of the software was also supported by the JBIC through a study in 2006 for the Transportation Sector Loan for National Road Network Improvement.

VRA is appropriate for this task besides the NTSC and local authorities because the VRA is directly responsible for road management and thus understand reasons for accidents well

### 3.3.2 Land Acquisition and Resettlement

(To Local Government)

There is a need for institutional capacity development of provincial governments (including district, and commune levels), which are responsible for implementation of land acquisition and resettlement operations, in order to conduct the operations in a timely and proper manner as well as to mitigate the possible negative social impacts on the affected people by the project. The proposed countermeasures for local governments are:

a) Professional and technical training to the land acquisition and resettlement committees' members and staff should be strengthened in order to implement the guideline in an objective manner;
b) Full-time staff should be assigned to the land acquisition and resettlement committees to enable more efficient and effective operations;
c) Compensation rates of affected lands and structures should be consistent with prevailing market prices;
d) A range of mitigation measures to minimize the negative impacts on the resettled people, who may suffer from unfavorable social and economic changes as a result of the resettlement, should be promoted. In this case, special attention must be paid to the vulnerable people, including the poor and the aged who find it difficult to recover their previous living standards after losing their livelihoods due to the resettlement. Possible measures which could be listed include provision of technical and vocational training for those who are forced to change their occupations, support for channeling to new and alternative employment opportunities, and other supportive measures.
e) In order to design and implement a feasible plan for mitigation measures, close communication and consultation with anticipated project affected people as well as a good coordination with PMU and line agencies of the project are essential.

### 3.3.2 Harmonization

(To MOT, MOF, MPI, MOC)

Ministry of Transport (MOT) and related Ministries such as Ministry of Planning and Investment (MPI), Ministry of Finance, Ministry of Construction need to recognize that there is necessary to harmonize the Vietnamese legal policy and procedures of ODA projects with the donor's guidelines.

### 3.3.3 Maintenance

(To VRA, MOF, MOT)

The VRA should continue efforts to give proper maintenance works to the highway to ensure sustainability. In addition, the Government and the MOF should continue consideration of having a separate budget for road maintenance (e.g. Road Maintenance Fund).

**Comparison of Original and Actual Scope**

| Item | Plan | Actual |
|---|---|---|
| 1) Outputs<br>(a) Rehabilitation and replacement of bridges | <u>Phase I (VNI-5, VNII-5, VNIII-5)</u><br>**Hanoi-Vinh:** 6 bridges, 2 overpass<br>**Nha Trang-HCMC:** 14 bridges<br>**HCMC-Can Tho:** 19 bridges<br><br><u>Phase II-1 (VNIII-7)</u><br>**Bac Giang-Hanoi:** 4 bridges<br>**Dong Ha-Nha Trang:** 5 bridges<br><br><u>Phase II-2 (VNIV-7)</u><br>**Lang Son-Bac Giang:** 10 bridges<br><br><u>Phase II-3 (VNVI-7)</u><br>**Dong Ha-Nha Trang:** 5 bridges<br><br>Total: 63 bridges, 2 overpasses | <u>Phase I</u><br>**Hanoi-Vinh:** 6 bridges(+4.9km connecting road), 3 overpass, 1 bypass road (13km), 5 feeder roads (29km)<br>**Nha Trang-HCMC:** 14 bridges (+4.3km connecting road)<br>**HCMC-Can Tho:** 25 bridges (+9.8km connecting road)<br><br><u>Phase II-1 (VNIII-7)</u><br>**Bac Giang-Hanoi:** 4 bridges (+2.7 connecting road)<br>**Dong Ha-Nha Trang:** 5 bridges (3.4 connecting road)<br><br><u>Phase II-2 (VNIV-7)</u><br>**Lang Son-Bac Giang:** 10 bridges (+2.5km connecting road)<br><br><u>Phase II-3 (VNVI-7)</u><br>**Dong Ha-Nha Trang:** 9 bridges (+16.3km connecting road), 1 bypass road (5.5km), 2 provincial roads (4.2km)<br><br>Total: 73 bridges (+43.9km connecting road), 3 overpasses, 2 bypass road (18.5km), 5 feeder roads (29km), 2 provincial roads (4.2km) |
| (b) Consulting service | Total:3,629 M/M<br>- International engineers: 651 M/M<br>- Vietnamese engineers: 1,640 M/M<br>- Local assistant staff: 1,338 M/M | Total:9,120 M/M<br>- International engineers: 1,131M/M<br>- Vietnamese engineers: 2,719 M/M<br>- Local assistant staff: 5,270 M/M |
| 2) Project Period (Entire Phase) | January 1994 – February 2003<br>(9 years 2 months) | January 1994 – December 2005<br>(12 years) |
| 3) Project Cost<br>Foreign Currency<br>Local Currency<br><br>Total<br>ODA Loan Portion<br>Exchange Rate | <br>22,181 Million Yen<br>19,900 Million Yen<br>(1,990 Million VND)<br>42,081 Million Yen<br>35,853 Million Yen<br>1 VND= 0.01Yen<br>(As of 1993)<br><br>*Note: Planned project cost is based on the appraisal of Phase II-3 (VNVI-7) in 1998.* | <br>27,998 Million Yen<br>7,629 Million Yen<br>(926,842 Million VND)<br>35,627 Million Yen<br>31,561 Million Yen<br>1 VND = 0.008 Yen<br>(1994-2006 Average) |