

5-6 調査実施上の留意点

(1) 対象地域全体の道路整備計画の中での対象道路の位置付けについて

ベトナム政府による関連調査の中では、本調査の対象道路の将来像について明確な解答を出していないように思われる。将来にわたって地域間交通を支える幹線道路と考えるのか、いずれは平行して建設される自動車専用道路にその任を引き継がせるのかによって、本調査の中で提案する設計条件や設計基準も異なってくるであろうし、周辺的环境や社会に与える影響も変わってくるであろう。本調査の中で将来像を明確にしておく必要がある。

(2) 関連調査との整合性

ベトナム政府による関連調査に基づいて一部のバイパスや架け替え橋梁は、既に事業実施段階に入っている。また、KOICA によって F/S 調査が完了しているチリン～パイチャイ区間は、先行して事業実施に移されるものと思われる。設計条件や設計基準は、これらの既存事業で採用されているものを十分に考慮して、整合のとれた計画とすることも求められる。これは前項の留意点と矛盾する面もあるが、一本の道路としての連続性の確保と求められる機能性の確保という二つの命題の中で接点を見つける必要がある。

(3) 市街地の幅員構成について

対象道路は、現在幹線道路としての役割を果たしているのは勿論、市街地およびその近郊においては、収穫物を自転車等で市場に運ぶ農道の通学路として、時には井戸端会議場や遊び場としても利用されている。バイパスが建設される場所では、これらの生活道路としての役割が現道に残されるが、それ以外の市街地においては両方の役割を兼られるような幅員構成を検討する必要がある。幸いに多くの市街地部で 20～25 m の道路用地幅が確保されているので、これを有効に活用すべきであろう。

(4) 維持管理計画について

側溝や管渠の維持、砂利路肩の整備や草刈り、ポットホールの修復等の資機材をあまり要さない種類の維持・修繕については、7～8人のクルーによって行われているのを目にしたが、橋梁の維持・修繕などはほとんど行われていないように思われる。対象道路だけでなく同国滞在中に目にした多くの鋼橋では、塗装が劣化して腐食が始まっていた。本調査で提案する維持管理計画の中では、提案する計画が予算的な裏付けを持って実行されるためにも、維持管理の重要性を経済性の面からも強調してベトナム政府の理解が得られるようにすることが重要であろう。

(5) 資料の収集

ベトナムでは資料を入手するのに相当の時間を要する。同じ省内においても部局内、または上位機関の決裁を得るという手続きを踏むのが一般的である。したがって、本格調

査時には、調査作業に必要となる資料を検討し、それを事前に十分な余裕を持ってベトナム側に提示し、協力を求めなければならない。このときカウンターパートチームを十分に活用し、資料収集の効率化を図ることが重要となる。運輸省以外の機関の資料を入手するときは有料となることが多い。

(6) 資料の翻訳

関連資料の多くはベトナム語で書かれている。調査を円滑に進めるためには、資料を収集後速やかに翻訳して活用しなければならない。

(7) ローカルの人材の活用

環境調査では現地調査や地域住民、地元の有識者、地方政府等へのインタビューが重要な位置を占める。このため、ローカルの人材（ローカルコンサルタント、大学関係者、政府研究機関の研究者等）を積極的に情報収集や現地調査に活用することが重要となる。

(8) EIA 実施上の留意点

EIA の実施と審査をスムーズに進めるためには、本格調査の開始時に EIA の項目、審査のスケジュール、コンサルタントの選定等について科学・技術・環境省と協議し、さらには EIA 実施中にも連絡を密に取ることが重要となる。同様に、国道 18 号が通過するハノイ市、ハイフン省、ハバック省、クワンニン省の環境部とも協議が必要になるものと考えられる。

科学・技術・環境省の国際関係部（部長：Mr. Dau Dinh Loi）の Mr. Nguyen Zuan Bao Tam は日本留学（福島大学）の経験があり、日本チームとのコミュニケーションの円滑化に貴重な人材ではないかと考えられる。

(9) EIA 評価実施方法

EIA は F/S の作業と同時並行的に進め、EIA の結果を逐次基本設計に反映させることが重要となる。EIA は現地踏査、観測、インタビュー、既存資料の分析を主な手法として実施するものとする。

(10) ローカルコンサルタントの実態、自然条件調査

ベトナムでは自然条件調査を実施する機関は、運輸省、建設省、水資源省、鉱山省、エネルギー省等の省庁に属している。独立採算制を取っているところが多く、半官・半民の組織である。省庁に属しない民間のコンサルタントはまだ育っていない。

運輸省で自然条件調査を実施する機関は TEDI (Transport Engineering Design Institute) に属している。各調査を実施する TEDI の機関は次のとおりである。

地形測量：Road and Highway Enterprise, TEDI

土質調査：Geological Engineering and Survey Enterprise, TEDI

地形測量については航空写真測量が実施でき機動力がある機関として Vietnam Scien-

tific Production Union of Geodesy and Cartography がある。この機関は最新の航測機材と図化装置を有しており、技術的にもレベルが高い。

土質調査を実施できる機関として建設省所管の Construction Survey Enterprise 4 (CSE 4)、Institute for Building Science and Technology 所属の ADB—COFEC などがある。TEDI を含めてこれらの機関はボーリング、標準貫入試験、サンプリング、基本的な土質試験の実施が可能である。ただし、試験設備が旧式であることと今まで主にロシアの仕様で試験を行ってきたことより、本格調査では明確な仕様書を作成し、現場および試験室では厳密な管理を行わなければならない。

(II) ローカルコンサルタントの実態、環境調査

環境調査を行っている国立研究機関はいくつかあるが、民間組織としては 1990 年に設立された “Institute of Ecological Economy” のみである。当研究所は科学・技術・環境省、国立の環境調査機関、ハノイ大学資源環境各部等と密接な関係を保っており、これらの機関より人的協力を得ている。気象、海象、土壌、生物、環境評価等の諸分野の専門家がいますが、プロジェクト毎に必要なに応じて上記の機関などより人材をリクルートして調査チームを編成するとのことである。

Institute of Ecological Economy

Director : Prof. D. Sc. Nguyen Van Truong

Address : Van Mieu-Quoc Tu Giam, Hanoi, Vietnam

Tel. : 2.25292/2.52917

(12) 本格調査の円滑な実施

ヴェトナム政府は、本調査をできるだけ早く終了し、円滑款により事業実現を図りたい意向である。従って、この事を踏まえて本調査を実行していく必要がある。

付 属 資 料

1. 要請書 (TERMS OF REFERENCE)	81
2. SCOPE OF WORK	89
3. MINUTES OF MEETING	97
4. 質問書および回答	103
5. 収集資料リスト	111
6. 韓国調査報告書目次 (チリン～バイチャイ間)	113
7. 越側調査報告書 (ノイバイ～バクニン間)	121

1. 要請書 (TERMS OF REFERENCE)

TERMS OF REFERENCE FOR THE FEASIBILITY STUDY ON

THE HIGHWAY No.18 IMPROVEMENT IN VIETNAM

I. BACKGROUND

The Government of the Socialist Republic of Vietnam represented by its Ministry of Transport and Communications requested the Government of Japan represented by ... to conduct the Feasibility Study on the Highway No.18 Improvement (hereafter referred to as "the Study"). This Terms of Reference is prepared to define major contents of the Study and to clarify the contributions of both Governments.

The Highway No.18 is one of the important routes in North Vietnam which links Hanoi and the northern delta with the major industrial area in North East region and, also, follows one segment of Route No.4 to the border of China.

The Highway No.18 provides a convenient artery link to Cai Lan Port, which is planned to develop into the deep sea port with the estimated capacity of 10 million tons/year by the 2000, from the hinterland, northern delta rich in resources.

While the importance of the Highway No.18 in present economic development stage can be clearly recognized as mentioned above, the Highway No.18 does not meet the traffic demands and requirements. In addition, there low-filled sections (about 10 km) which cause traffic interruption for 10-30 days during flood period, Even at ordinary times, the condition of the Highway No.18 is so poor that average speed of vehicles is 30-40 km/h. So the Highway No.18 does not function fully as a main industrial & tour road. For this reason, the Highway No.18 Improvement Project is considered urgently needed as a main priority project in Vietnam.

II. OBJECTIVE

The main objective of the Study is to review and analyze the feasibility of road improvement in the constructing the whole length of Highway No.18 except the segment from km37 to km118. In addition to that the Study will also consider other road sections linking to the Highway No.18 such as the section from Bac Ninh to Phu Lo and the section from Tien Yen to Mui Ngoc

III. IMPLEMENTATION PLAN

The Study will be based upon the examination of every available data in the project area including research papers about socio-economic development and traffic system, various study reports, present development plans, etc.

In consideration of population growth, production increase, and income, traffic volume of representative vehicles will be forecasted in the project influence areas.

The Study will review and analyze the most economic plan and estimate Feasibility Study level overall construction cost for the pavement rehabilitation including the improvement of the condition of existing pavement, and the widening of the road.

In addition, the Study will recommend the further detailed design and various methods of road improvement after the examination of social benefit (or cost), economic evaluation, environmental influence accruing from the improvement of the road in the project influence areas, etc.

IV. SCOPE OF SERVICES

The consulting services shall undertake the following:

1. Survey on the socio-Economic Conditions

Collection and Review of all available data, previous study reports and current development plans related to the socio-economic development and the transport system in the project areas, and provision of economic profile for the areas.

- (1) Review and analysis of the present situation and forecast of socio-economic activities in the project influence areas.
- (2) Analysis of transition of transport policy and demand
- (3) Plan for economic development and land use in the project areas.

2. Traffic Survey

Preparation of traffic forecasts by representative vehicle types taking into account population growth rates, production increase, and income in the project influence areas and assessment of the possibility of traffic diversion from other modes and road routes taking into account transport cost and other relevant factors.

- (1) Review and Analysis of traffic movements
- (2) Estimation of future traffic demands

3. Field Survey

Topographic classification using maps, selected complementary field survey and observation, standardization of existing road conditions and improvement objectives.

- (1) Topographic survey and soil/material investigation
- (2) Survey on the existing pavement condition and pavement structures
- (3) Study on the existing road inventory conditions and structures
- (4) Hydrological Survey

4. Preliminary Design

Identification of Cost-effective way of rehabilitating and widening the pavement, preparation of preliminary designs for the selected high priority road links, preparation of construction quantities and Feasibility Study level overall construction costs for improvement executing agency.

- (1) Establishment of preliminary design methods
- (2) Preparation of design standards and guidelines
- (3) Preliminary design
- (4) Feasibility Study level overall construction cost

5. Economic Analysis
 - (1) Analysis of economic vehicle operating cost
 - (2) Economic evaluation and socio-economic impact study
 - (3) Identification of Socio Benefit (or Cost) likely to accrue from the road improvement
6. Identification of environmental impact in the project influence areas
7. Preparation of Feasibility Study report.

VI. INPUTS TO BE MADE BY THE AUTHORITIES CONCERNED

For the successful execution of the Study, the following inputs shall be made by Japanese and Vietnamese authorities.

1. Man-Power

- (1) The Study team will be composed of well-qualified experts from various disciplines as shown below:

Position	Japan			Vietnam	
	No	Man-Months		No	Man-Months
		Total	Home Japan)		
Team Leader					
Highway Engineer					
Bridge Engineer					
Traffic Engineer					
Highway Engineer					
Structural Engineer					
Soil/Material Engineer					
System Engineer					
Cost Estimator					
Transport Economic					
Total					

- (2) Wages, living allowances and traffic cost of the both countries' experts will be burdened by the Project budget during the Study

2. Input by the Japanese Authority

- (1) Field Survey and Investigation cost for the execution of the Study
- (2) Rental and maintenance cost of cars and office equipment
- (3) ^{Rental and} Maintenance cost of office
- (4) Preparation of reports on the Study
- (5) On the job training in Japan for one (1) highway engineer, one (1) bridge engineer and one (1) soil/foundation engineer each one month for technology transfer.

3. Input by Vietnamese Authority

- (1) Support of data & field activities
 - MOTC shall provide all existing study reports, maps, survey data, reference plans, all economic statistics and other publications (design standards, specifications, etc) relevant to the study to Japan consultants without any charge;
 - And, also secure and support Japanese consultants to carry out field activities for data examination.
- (2) ^{Arrangement for rent} Provision of adequate office space for Japanese consultants
- (3) Safety of consultants and exemption from taxes
 - Ensurement of safety of Japanese consultants during their entry into, exit from and stay in Vietnam.
 - Exemption of Japanese consultants and their equipments for the study from any taxes, duties, levies and other imposition imposed under the laws and regulations in effect in Vietnam.

VII. REPORTING SCHEDULE

Inception Report

Ten copies will be submitted within two months after the commencement of the Study and it will contain detailed work program, etc.

Draft Final Report

Ten copies will be submitted within eight and half months after the commencement of the Study and the Vietnamese Government shall deliver its comments on the Draft Final Report in four weeks after the Submission of the report.

Final Report

Twenty copies within ten and half months after the commencement of the Study.

2. SCOPE OF WORK

SCOPE OF WORK

FOR

THE FEASIBILITY STUDY ON THE HIGHWAY NO.18 IMPROVEMENT

IN VIET NAM

AGREED UPON BETWEEN

MINISTRY OF TRANSPORT

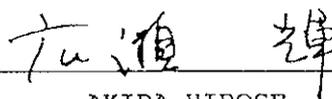
AND

JAPAN INTERNATIONAL COOPERATION AGENCY

HANOI, JAN. 23, 1995



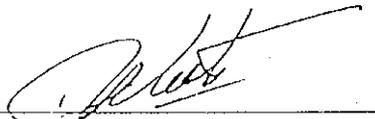
NGUYEN VIET TIEN
GENERAL DIRECTOR,
NO.18 PROJECTS MANAGEMENT UNIT,
MINISTRY OF TRANSPORT



AKIRA HIROSE
LEADER,
PREPARATORY STUDY TEAM,
JAPAN INTERNATIONAL
COOPERATION AGENCY



TRAN DOAN THO
DEPUTY DIRECTOR GENERAL,
PLANNING AND INVESTMENT DEPARTMENT,
MINISTRY OF TRANSPORT



NGUYEN NGOC NHAT
GENERAL DIRECTOR,
DEPARTMENT OF TRANSPORT
AND COMMUNICATION,
STATE PLANNING COMMITTEE

I. Introduction

In response to the request of the Government of the Socialist Republic of Viet Nam (hereinafter referred to as "Viet Nam"), the Government of Japan has decided to conduct the Feasibility Study on the Highway No.18 Improvement in Viet Nam (hereinafter referred to as "the Study"), in accordance with the relevant laws and regulations in force in Japan.

Accordingly, the Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of technical cooperation programs of the Government of Japan, will undertake the Study in close cooperation with the authorities concerned of Viet Nam.

The present document sets forth the scope of work with regard to the Study.

II. OBJECTIVES OF THE STUDY

The objective of the study is :

To carry out the feasibility study on the Highway No.18 improvement.

Study sections are :

1. Bac Ninh - Chi Linh (approximately 37kilometers, including Pha Lai bridge)
2. Hon Gai - Bac Luan (approximately 182kilometers)
3. Bac Ninh - Noi Bai Airport (approximately 30kilometers)

U3

Dho

At Rev

III. SCOPE OF THE STUDY

In order to achieve the objectives mentioned above, the Study shall cover the following items.

1. Collection, review and analysis of existing data, information and studies
 - (1) Socio-economic data
 - (2) Development programs
 - (3) Road administration
 - (4) Traffic data (ex. traffic volume, axle load data, etc.)
 - (5) Engineering data (ex. topographical, geological, hydrological, meteorological data, etc.)
 - (6) Other data necessary for the study
 - (7) Reports of previous studies/projects relevant to the Study
2. Reconnaissance survey
3. Problem identification
 - (1) Inventory survey (road, bridge, drainage, slope, environment, etc.)
 - (2) Establishment of improvement level and identification criteria
 - (3) Problem identification
4. Supplementary survey
 - (1) Origin - Destination survey
 - (2) Other surveys necessary for the study
5. Formulation of socio-economic framework
6. Future traffic demand forecast
7. Setting up of design criteria
8. Setting up of alternative solutions (for the problems)
9. Preliminary design
10. Construction plan
11. Preparation of management and maintenance plan
12. Cost estimation
13. Environmental impact assessment
14. Economic and Financial analysis
15. Implementation Plan
16. Overall evaluation and recommendation

DRS

*U3
30*

Out Rec

IV. STUDY SCHEDULE

The Study will be carried out in accordance with the attached tentative schedule (Appendix)

V. REPORTS

JICA shall prepare and submit the following reports to Viet Nam.

1. INCEPTION REPORT

Thirty (30) copies in English at the beginning of the study in Viet Nam.

2. INTERIM REPORT

Thirty (30) copies in English within 5 months after beginning of the study.

3. DRAFT FINAL REPORT

Thirty (30) copies in English within 8 months after beginning of the study.

Government of Viet Nam shall provide JICA with its comments in English within one (1) month after the submission of Draft Final Report.

4. FINAL REPORT

Fifty (50) copies in English within one (1) month after the receipt of the written comments on the Draft Final Report from Viet Nam.

AKS

WZ

Chitorea

VI. UNDERTAKING OF THE GOVERNMENT OF VIET NAM

1. The Government of Viet Nam shall facilitate the carrying out of the Study in accordance with the prevailing laws and regulations stipulated by the Vietnamese State, as follows :

- (1) to secure the safety of the Japanese study team;
- (2) to permit the members of the Japanese study team to enter, leave and stay in Viet Nam for the duration of their assignment therein, and exempt them foreign registration requirements and consular fees;
- (3) to exempt the members of the Japanese study team from taxes, duties, fees and other charges on equipment, machinery and other materials brought into Viet Nam for the conduct of the study;
- (4) to exempt the members of the Japanese study team from income tax and charges of any kind imposed on or in connection with any emoluments or allowances paid to the members of the Japanese study team for their services in connection with the implementation of the Study;
- (5) to provide necessary facilities to the Japanese study team for remittance as well as utilization of the funds introduced into Viet Nam from Japan in connection with the implementation of the Study;
- (6) to obtain permission for entry into special area regarded to be necessary for the purpose of implementing the Study;
- (7) to obtain permission for the Japanese study team to take out all data and documents including maps and photographs necessary for the Study out of Viet Nam to Japan; and
- (8) to provide medical services as needed. Its expenses will be chargeable on the members of the Japanese study team.

2. The Government of Viet Nam shall bear claims, if any arises, against the members of the Japanese study team resulting from, occurring in the course of, or otherwise connected with, the discharge of their duties in the implementation of the Study, except when such claims arise from gross negligence or willful misconduct on the part of the members of the Japanese study team.

3. Ministry of Transport shall assign counterpart governmental agency to the Japanese study team and who also acts as a coordinating body in relation with other governmental and non-governmental organizations concerned for the smooth implementation of the Study.

Dhs

LSH

W. Drew

4. Ministry of Transport shall, at its own expense, provide the Japanese study team with the followings, in cooperation with other organization concerned:

- (1) available data and information at the Ministry related to the Study;
- (2) counterpart personnel;
- (3) suitable office space with necessary furniture in Hanoi; and
- (4) credentials or identification cards.

VII. UNDERTAKING OF JICA

For the implementation of the Study, JICA shall take the following measures:

1. to dispatch, at its own expense, the study team to Viet Nam; and
2. to pursue technology transfer to the Viet Nam counterpart personnel in the course of the Study.

VIII. OTHERS

JICA and Ministry of Transport, shall consult with each other in respect of any matter that may arise from or in connection with the Study.

Sch

*U
A*

JICA

TENTATIVE SCHEDULE

Month	1	2	3	4	5	6	7	8	9	10
Work in Viet Nam										
Work In Japan	□									□
Report Presentation	△ IC/R				△ IT/R			△ DF/R		△ F/R

IC/R: Inception Report
 IT/R: Interim Report
 DF/R: Draft Final Draft
 F/R: Final Report

Handwritten signature

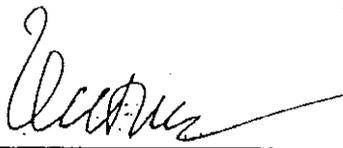
Handwritten initials

Handwritten signature

3. MINUTES OF MEETING

MINUTE OF MEETING
ON
THE SCOPE OF WORK
FOR
THE FEASIBILITY STUDY ON THE HIGHWAY NO.18 IMPROVEMENT
IN VIET NAM
BETWEEN
MINISTRY OF TRANSPORT
AND
JAPAN INTERNATIONAL COOPERATION AGENCY

HANOI, JAN. 23, -1995



NGUYEN VIET TIEN
GENERAL DIRECTOR,
NO.18 PROJECTS MANAGEMENT UNIT,
MINISTRY OF TRANSPORT



AKIRA HIROSE
LEADER,
PREPARATORY STUDY TEAM,
JAPAN INTERNATIONAL
COOPERATION AGENCY

MINUTES OF MEETING

The Japanese Preparatory Study Team organized by Japan International Cooperation Agency, headed by Mr. Akira Hirose visited the Socialist Republic of Viet Nam from January 11 to 24, 1995 for the purpose of discussing the Scope of Work for "The Feasibility Study on the Highway No.18 Improvement in Viet Nam" (hereinafter referred to as "the Study").

The Japanese Preparatory Study Team exchanged view and had a series of discussions with representatives of the Ministry of Transport (hereinafter referred to as "MOT") and State Planning Committee. A list of the participants appears in Attachment I.

Through these discussions, both sides have completed the Scope of Work for the Study.

As a result, both sides confirmed the following points :

1. Both sides agreed that the Japanese study team shall submit executive summary of each report for translation them from in English to in Vietnamese by the Vietnamese side.
2. Both sides agreed that engineering surveys such as topographic survey, geological survey and traffic survey, necessary for the study shall be undertaken by the Japanese study team at own expense.
3. The Vietnamese side requested that Japanese study team shall at its expense prepare office space because the Vietnamese side's budget is limited. The Japanese side promised to convey this request to JICA Headquarter in Tokyo.
4. Both sides agreed that the Japanese study team shall at its expense have opportunity to hold the presentation meeting for each report to the relevant authorities of Viet Nam.
5. The Vietnamese side requested that the Vietnamese counterpart personnel take advantage of training in Japan related to the Study to promote an effective technology transfer. The Japanese side promised to convey this request to JICA Headquarter in Tokyo.

ly

des

6. Both sides recognized that the environmental consideration is an important matter and concluded that the following items are especially necessary to study as the result of the Screening and Scoping of environmental matters :

- (1) resettlement due to land occupancy,
- (2) change of production chances, social structure, etc.,
- (3) effect of traffic to residence and public facilities such as school and hospital,
- (4) effect of waste from construction to social and natural environments,
- (5) air pollution due to exhaust gas and dust of coal, and
- (6) noise and vibration from cars.

WJC

WJC

Attendance List

Japanese sideJapanese Preparatory Study Team

Mr. Akira Hirose	Leader / Road Improvement Planning	Deputy General Director of Road Department, Chubu Regional Construction Bureau, Ministry of Construction
Mr. Akira Takaku	Road Structure / Traffic Survey	Assistant Director, Overseas Business Development Section, Nippon Engineering Consultants Co., Ltd.
Mr. Masakazu Takahashi	Natural Condition / Environment	Manager, International Division, Oyo Corporation
Mr. Hidenori Kumagai	Study Planning	First Development Study Div., Social Development Study Department, Japan International Cooperation Agency

Embassy of Japan

Mr. Shiro Sadoshima	Counsellor
Mr. Junichi Kawaue	First Secretary

U
M
S

U
M
S

Vietnamese side

State Planning Committee

Mr. Nguyen Ngoc Nhat General Director,
Department of Transport and Communication

Ms. Nguyen Xuan Tien Foreign Economic Relations Department

Ministry of Transport

Mr. Le Ngoc Hoan Vice Minister

Mr. Tran Doan Tho Deputy Director,
Planning and Investment Department

Mr. Nguyen Vinh Loc Deputy Director,
International Relation, Department

Ms. Nguyen Tharh Hang Expert, Planning and Investment Department

Mr. Nguyen Viet Tien General Director,
No.18 Projects Management Unit

Mr. Do Kim Quy Director of Engineering Department,
No.18 Projects Management Unit

Mr. Eguyen Huu Vinh Director, Planning - Economic Department,
No.18 Projects Management Unit

Mr. Le Huu Chien Deputy Director, Engineering Department,
No.18 Projects Management Unit

Ms. Ngo Anh Thu Assistant, No.18 Projects Management Unit

Mr. Le Lan Director of Technical Department,
Transport Engineering Design Institute

Mr. Do Bac Senior Engineer,
Chief of Highway Design Section,
Transport Engineering Design Institute

Quang Ninh People's Committee

Mr. Tran Quyen Director,
Foreign Relations and Economic Department

Uz

Uz

4. 質問書および回答

I. GENERAL INFORMATION CONCERNING THE IMPLEMENTATION OF THE STUDY

I T E M	D E S C R I P T I O N	A N S W E R
1. Study Road	<p>(1) Beginning and end of the Study Road</p> <p>(2) Is the study on the proposed bridges at Pha Lai and Hong Gai ferries requested to be included?</p>	<p>Bac Ninh - Chi Linh (approx. 37 kilometers) Hon Gai - Bac Luan (approx. 182 kilometers) Bac Ninh - Noi Bai Airport (approx. 30 kilometers) Pha Lai Bridge is requested to be included. Bai Chay Bridge at Hong Gai is not requested.</p>
2. Government Organization	<p>(1) Name of agencies and their organization charts which are responsible for : - Planning, - Construction, - Maintenance, and - Operation of ferriboats of National, Provincial, District and other rural roads.</p> <p>(2) Necessity of the Steering Committee for the Study and proposed member institutions of the committee</p>	<p>For the large scale projects such as the Highway No. 18 Improvement, the Project Management Units (PMU) are established and designated as Implementing Agencies which are responsible for planning, design and construction of the projects. As to other national highway projects, Road Administration Bureau, Ministry of Transport is an agency who is responsible for planning, design and construction. Maintenance works for all national highways are conducted under the management of Road Management Unit, RAB. Ferriboats are operated by the Provincial Governments. Operators of Pha Lai and Bai Chay Ferries are Ha Bac and Quan Ninh Provinces, respectively.</p>
3. Budget	<p>(1) Annual budget (for the last 5 years) for - Improvement / construction, and - Maintenance of National, Provincial, District and other rural roads.</p> <p>(2) Future budgetary plan for the implementation of the Project</p>	<p>Foreign assistance is expected for the implementation of the project.</p>
4. Any specific restrictions related to the Study		

II. TECHNICAL DATA / INFORMATION

I T E M	DESCRIPTION	NEEDS	A N S W E R		
			AVAIL- ABILITY	PLACE OF DATA AVAILABLE	NAME OF DATA
1. Topographic maps covering the Study area	(1) 1:50,000 scale (2) 1:25,000 and 1:10,000 scale (3) Larger scales (Specify)		A A A	- Map Center - Map Center - PMU 18	- Series L7014 (Year 1965) - Topographic survey along the Study Road - Photos taken in 1958-1974
2. Aerial Photograph covering the Study area	(1) 1:20,000 - 1:10,000 scale (2) Larger scales (Specify)		A		
3. Geodetic data along the Study road	(1) Triangulation point network and data (2) Bench-mark network (3) Point description (Control points, bench-marks)		A A A	- Measurement and Map Department	
4. Geological data in the Study area	(1) Geological maps (2) Reports of geological/soil investigation conducted in the past or on-going projects (3) Others		A A	- PMU 18	- Geological Survey Reports for Noi Bai - Bac Ninh, Bac Ninh - Bac Luan, Chi Lin - Bai Chay, Pha Lai & Bai Chay Bridges - Geology of Vietnam (1992)
5. Meteorological data in the Study area	(1) Rainfall data (monthly, daily) (2) Temperature data (3) Earthquake data (4) Others		A	- Institute of Geophysics	- Epicenter Distribution Map
6. Hydrological data of rivers crossing the Study road	(1) Stream gauging data (2) Flood records (area, depth, duration) (3) Others		A	- Water-stage Measuring Stations	

- 1) Data / information marked with "X" in the column of "NEEDS" are requested to be provided for the Preparatory Study Team
- 2) Please mark the data available for the Study with "A" in the column of "AVAILABILITY", and indicate name of agencies where the data are available and the complete name of data.
- 3) Please mark the data not available for the Study with "N".
- 4) Answers for some items have been filled out by the Preparatory Study Team. Please correct or update them, if necessary.

(Continuation)

I T E M	DESCRIPTION	NEEDS	A N S W E R		
			AVAIL- ABILITY	PLACE OF DATA AVAILABLE	NAME OF DATA
7. Data / information of the Study road and related roads including Highway Nos. 1, 4, 5, 10, 18, 13, 279, 286 and 379 and major provincial roads	(1) Road network maps	X	A	- RAB	Periodic traffic survey is carried out by the local governments. However, results aren't reliable.
	(2) Road inventories	X	A	- RAB	
	(3) Bridge inventories	X	A	- RAB	
	(4) Record of the past disasters (floods, slope failures, etc.)		A	- RAB	
8. Periodic traffic survey system	(1) Types of survey	X	N		- Feasibility Study on the Highway No. 18 Improvement, KOICA
	(2) Location of survey stations	X	N		
	(3) Interval, period, survey item, etc.	X	N		
9. Past and present traffic data of the Study road and related roads	(1) Traffic volume by vehicle type	X	A	- PMU 18	- Vietnamese Standards of Highway Design (TCVN-4054-85)
	(2) Bus data (route, number of passenger)		A	- RAB	
	(3) Ferryboat data (number of passenger and vehicle carried, etc.)		A	- People's Committee	
	(4) Record of traffic accidents (type, causes, location, damage, etc.)				
	(5) Number of vehicles registered				
10. Design standards	(1) Highway design		A		- Feasibility Study on the Highway No. 18 Improvement, Noi Bai - Bac Ninh, Bac Ninh - Bac Luan, Chi Lin - Bai Chay, Pha Lai Bridge, Bai Chay Bridge
	(2) Bridge design		A		
	(3) Others				
11. Reports / information of the on-going and proposed road/bridge projects in the Study area (including the improvement of Chi Linh - Bay Chay Section.)	(1) Description of the project	X	A	- PMU 18	
	(2) Implementation schedule	X	A	- PMU 18	
	(3) Current status	X	A	- PMU 18	
	(4) Others	X	A	- PMU 18	

1) Data / information marked with "X" in the column of "NEEDS" are requested to be provided for the Preparatory Study Team
 2) Please mark the data available for the Study with "A" in the column of "AVAILABILITY", and indicate name of agencies where the data are available and the complete name of data.

3) Please mark the data not available for the Study with "N".

4) Answers for some items have been filled out by the Preparatory Study Team. Please correct or update them, if necessary.

III. SOCIO-ECONOMIC DATA / INFORMATION

ITEM	DESCRIPTION	NEEDS	ANSWER		
			AVAILABILITY	PLACE OF DATA AVAILABLE	
1. Latest socio-economic indices for the last 5 years	(1) GNP and GDP : National level		A	- Statistical Publishing House	- Statistical Year Book (1976-1993)
	(2) GDP : by Province		A	- Statistical Publishing House	- Statistical Year Book (1976-1993)
	(3) Major products : by Province		A	- People's Committee	- Statistical Year Book (1976-1993)
	(4) Major products : by District / Town		A	- Statistical Publishing House	- Statistical Year Book (1976-1993)
	(5) Foreign trade : Volume & value by sort of commodity		A	- General Statistical Office	- Economy & Trade of Vietnam
	(6) Foreign trade with China by land : Volume & value by sort of commodity		A	- People's Committee	
	(7) Population by Province		A	- Central Census Steering Committee	- Vietnam Population Census 1989
	(8) Population by District / Town		A	- Central Census Steering Committee	- Vietnam Population Census 1989
	(9) Population by Village		A		
2. National & regional development plans	(1) National development plan in force	X	A	- Government of Vietnam	- Economic Potential of Vietnam on the Threshold of the year 2000
	(2) Regional or provincial development plans	X	A	- State Planning Committee	- Summing-Up Socio-Economic Program of the 5 years Plan 91-95
	(3) Development plan of industrial estates, export processing zones, etc. in the Study area	X	A	- People's Committee	

- 1) Data / information marked with "X" in the column of "NEEDS" are requested to be provided for the Preparatory Study Team
- 2) Please mark the data available for the Study with "A" in the column of "AVAILABILITY", and indicate name of agencies where the data are available and the complete name of data.
- 3) Please mark the data not available for the Study with "N".
- 4) Answers for some items have been filled out by the Preparatory Study Team. Please correct or update them, if necessary.

(Continuation)

I T E M	DESCRIPTION	NEEDS	A N S W E R		
			AVAIL- ABILITY	PLACE OF DATA AVAILABLE	NAME OF DATA
3. Sector master plans	(1) Transport sector (2) Other sectors - Agriculture - Mining - Industry - Housing - Tourism - Others		A		- National Transport Sector Review - Master Plan on Transport Development in the Northern Part
4. Future socio-economic indices	(1) GNP and GDP : National level (2) GDP : by Province (3) Major products : by Province (4) Major products : by District / Town (5) Foreign trade : Volume & value by sort of commodity (6) Foreign trade with China by land : Volume & value by sort of commodity (7) Population by Province (8) Population by District / Town (9) Population by Village		A	- Government of Vietnam	- Economic Potential of Vietnam on the Threshold of the year 2000
5. Present and future land use plans and maps			A	- Statistical Publishing House - People's Committee	- Projections of Population, School Enrolment and Labour Force Vietnam, 1990 - 2005

1) Data / information marked with "X" in the column of "NEEDS" are requested for the Preparatory Study Team
2) Please mark the data available for the Study with "A" in the column of "AVAILABILITY", and indicate name of agencies where the data are available and the complete name of data.

3) Please mark the data not available for the Study with "N".

4) Answers for some items have been filled out by the Preparatory Study Team. Please correct or update them, if necessary.

IV. ENVIRONMENTAL ISSUES

I T E M	DESCRIPTION	NEEDS	A N S W E R		
			AVAIL- ABILITY	PLACE OF DATA AVAILABLE	NAME OF DATA
1. Legislation	(1) Laws / regulations		A	- National Political Publishing House	Law on Environmental Protection issued in July 1994
2. Procedure of environmental impact assessment		X	A	- Ministry of Science, Technology & Environment	
3. Ratification of international conventions		X	A	- do -	
4. Environmental condition of the Study area	(1) Vegetation maps	X			
	(2) Location of environmentally vulnerable areas	X			
	(3) Location of national parks and tourism spots	X			

- 1) Data / information marked with "X" in the column of "NEEDS" are requested to be provided for the Preparatory Study Team
- 2) Please mark the data available for the Study with "A" in the column of "AVAILABILITY", and indicate name of agencies where the data are available and the complete name of data.
- 3) Please mark the data not available for the Study with "N".
- 4) Answers for some items have been filled out by the Preparatory Study Team. Please correct or update them, if necessary.

V. OTHER INFORMATION

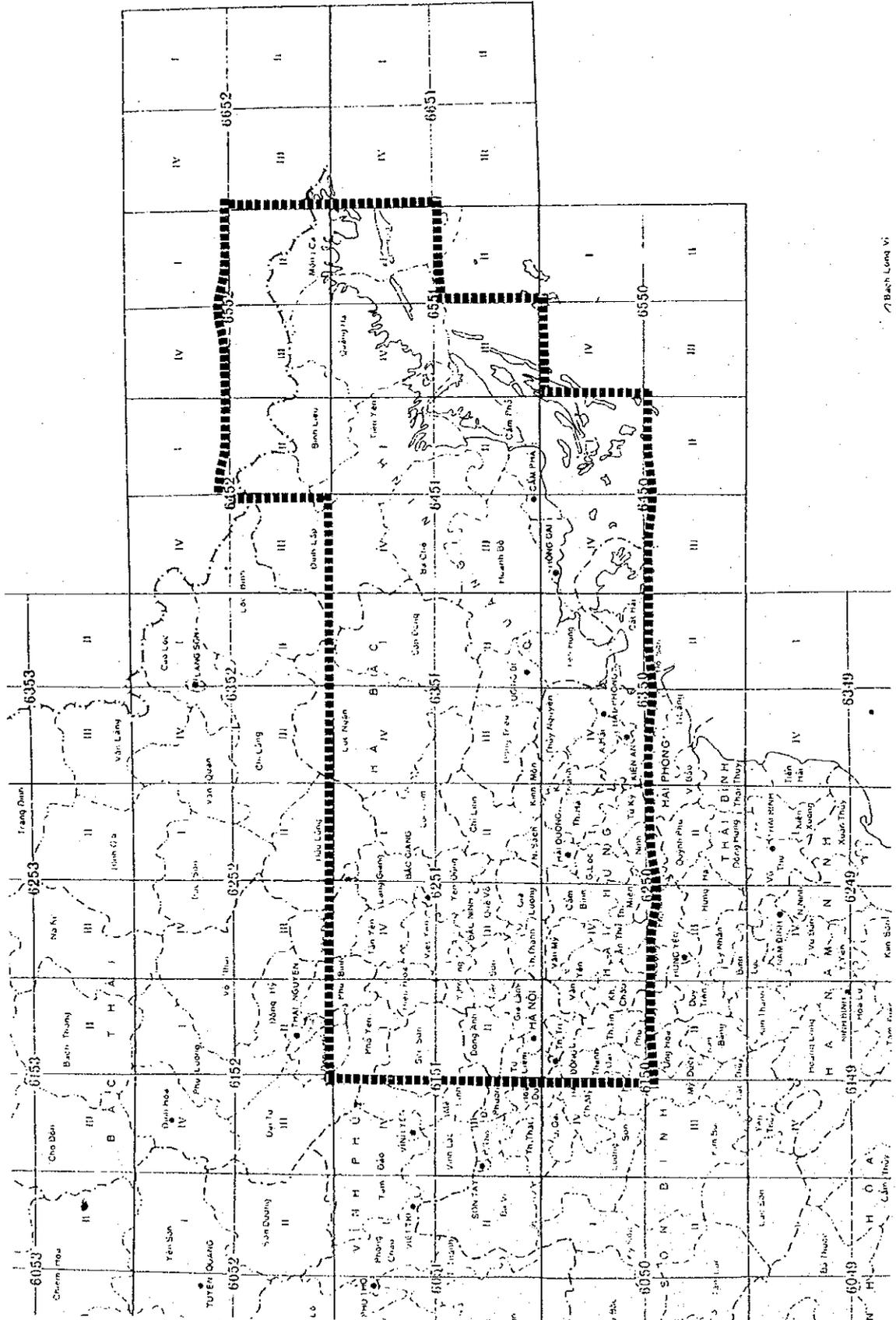
I T E M	DESCRIPTION	NEEDS	A N S W E R		
			AVAIL- ABILITY	AGENCIES IN CHARGE	NAME, MODEL, CAPACITY, NUMBER OF UNITS, ETC.
1. Availability of equipment, instruments, apparatus owned by the Government of Vietnam	(1) Instrument for topographic survey				
	(2) Apparatus for geological / soil investigation				
	(3) Apparatus for traffic survey				
	(4) Apparatus for axle load survey				
	(5) Apparatus for Roughness survey				
	(6) Computer				
	(7) Service vehicle				
2. List of Consultants	(1) Topographic survey	X	A	- PMU 18	-
	(2) Geological and soil investigation	X	A	- PMU 18	-
	(3) Traffic survey	X	A	- PMU 18	-
3. Typical consultant's fee	(1) Topographic survey	X	A	- PMU 18	-
	(2) Geological and soil investigation	X	A	- PMU 18	-
	(3) Traffic survey	X	A	- PMU 18	-

- 1) Data / information marked with "X" in the column of "NEEDS" are requested to be provided for the Preparatory Study Team
- 2) Please mark the data available for the Study with "A" in the column of "AVAILABILITY", and indicate name of agencies where the data are available and the complete name of data.
- 3) Please mark the data not available for the Study with "N".
- 4) Answers for some items have been filled out by the Preparatory Study Team. Please correct or update them, if necessary.

5. 収集資料リスト

地域	東南アジア	調査団名	国道18号改修計画	調査の種類	事前調査		
国名	ヴェトナム	配属機関名		現地調査期間	平成7年1月11日～7年1月24日		
番号	資料の名称	版型	ページ数	オリジナルコピーの別	部数	収集先名称又は発行機関	寄贈・購入(価格)の別
1	Economy of vietnam	A 5	212	オリジナル	1	Statistical Publishing House	購入
2	An Atlas of Vietnam	A 4 変形	421	オリジナル	1	Reclus-La Documentation Française	購入
3	Statistical Yearbook 1993	A 5	350	オリジナル	1	Statistical Publishing House	購入
4	Atlas Vietnam Population	A 4	111	オリジナル	1	Central Census Steering Committee	購入
5	Projection of Population, School Enrolment and Labour Force Vietnam, 1990-2005	A 4	195	オリジナル	1	Statistical Publishing House	購入
6	Vietnam Living Standards Survey 1992-1993	A 4	290	オリジナル	1	State Planning Committee--General Statistical Office	購入
7	Statistical Data of Vietnam's Economy 1993	A 4	212	オリジナル	1	Chamber of Commerce and Industry of Vietnam	購入
8	The Ha Long Bay and the Quang Ninh Province	A 5	87	オリジナル	1	The Gioi Publishers	購入
9	Vietnam-Tourism Master Plan to 2005 Year, Draft Summary	A 4	182	コピー	1	UNDP	寄贈
10	地形図 (1:50,000)		27面	オリジナル	1	Vietnam Scientific-Technology Institute of Land Administration	購入
11	地形図 (1:250,000)		4面	カラーコピー	1	Vietnam Scientific-Technology Institute of Land Administration	寄贈
12	地質図 (1:500,000)		4面	カラーコピー	1	Vietnam Scientific-Technology Institute of Land Administration	寄贈
13	水理地質図 (1:500,000)		2面	カラーコピー	1	Vietnam Scientific-Technology Institute of Land Administration	寄贈
14	Quang Ninh Province Conceptual General Plan	A 4 A 3	1 1	オリジナル	1	No.18 Projects Management Unit, MOT	寄贈
15	Organization Chart of No.18 Projects Management Unit	A 4	1	オリジナル	1	No.18 Projects Management Unit, MOT	寄贈

資料リスト 10 地形図 (1:50,000) 27面の範囲



7 Bach Lung VI

6. 韓国調査報告書目次 (チリン～バイチャイ間)

**The Feasibility Study on the Highway No. 18 Improvement Project in Viet Nam,
Final Report, September 1994
KOICA, Korea Consultants International**

Volume I Main Report

Chapter 1 Introduction

- 1-1 Background of the Project
- 1-2 Objectives of the Project
- 1-3 Outline of the Project
- 1-4 Study Program
 - 1-4-1 Work Schedule
 - 1-4-2 The Project Organization
 - 1-4-3 Duty Station
 - 1-4-4 Work Program and Manning Schedule

Chapter 2 Socio-Economic Activities and Transportation

- 2-1 Study Area for Socio-Economic Activities
- 2-2 Present Condition of the Study Area
 - 2-2-1 Population and Urbanization
 - 2-2-2 Economic Situation
 - 2-2-3 Development Plans
- 2-3 Road Transportation Network
 - 2-3-1 Overall Features of Road in the Northern Part of Vietnam
 - 2-3-2 Road Conditions
 - 2-3-3 Existing Status of Major Highway Networks

Chapter 3 Traffic Studies

- 3-1 Present Road Network
 - 3-1-1 Road Network System in Influential Area
 - 3-1-2 Transportation Trend in Study Area
- 3-2 Functional Classification and Traffic

- 3-2-1 Zoning
 - 3-2-2 Network
 - 3-2-3 Nodes and Links
 - 3-2-4 Travel Speed
 - 3-2-5 Minimum Time Path
 - 3-2-6 Identification of Passenger Car Unit and Design Hourly Volume
 - 3-3 Traffic Survey
 - 3-3-1 General
 - 3-3-2 Survey Method, Time and Locations
 - 3-3-3 Traffic Volume
 - 3-4 Trip Generation and Distribution
 - 3-4-1 Trip Generation
 - 3-4-2 Hourly Distribution of Person Trips
 - 3-4-3 Trip Length
 - 3-4-4 Trip Distribution
 - 3-5 Transportation Demand Modeling
 - 3-5-1 Modeling
 - 3-5-2 Modeling Process
 - 3-5-3 Network Assignment
 - 3-6 Result of Traffic Demand Forecast
 - 3-6-1 Forecast of Socio-Economic Factor
 - 3-6-2 Traffic Forecast by Zonal Production and Attraction
 - 3-6-3 Trip Distribution
 - 3-6-4 Traffic Projection
 - 3-7 Road Traffic Capacity Analysis
- Chapter 4 Engineering Study**
- 4-1 General
 - 4-2 Road Inventory
 - 4-2-1 Topographic Map
 - 4-2-2 Route Survey
 - 4-2-3 GPS (Global Positioning System) Survey
 - 4-2-4 Profile Survey
 - 4-2-5 Cross Section Survey

4-3 Soil Investigation

- 4-3-1 General
- 4-3-2 Objective and Scope of Survey
- 4-3-3 Method of Survey
- 4-3-4 Result of Survey

4-4 Geometric Design Standards

- 4-4-1 General
- 4-4-2 Geometric Design Standards
- 4-4-3 Typical Cross Section
- 4-4-4 Intersections

4-5 Earthwork and Soft Soil Treatment

- 4-5-1 General Earthwork Plan
- 4-5-2 Design Guideline for the Slope
- 4-5-3 Determination of Slope Gradient for the Proposed Project
- 4-5-4 Treatment of Soft Soil Area

4-6 Drainage Design

- 4-6-1 General
- 4-6-2 Data Collection and Field Investigation
- 4-6-3 Hydrologic Analysis
- 4-6-4 Design Criteria for Drainage Facilities
- 4-6-5 Required Drainage Structures

4-7 Structural Design

- 4-7-1 Design Criteria for Structures
- 4-7-2 Design of Bridge

4-8 Pavement Design

- 4-8-1 Pavement Type
- 4-8-2 Pavement Design Guide
- 4-8-3 Design Equations
- 4-8-4 Design Thickness of the Pavement
- 4-8-5 Review of Overlay Construction Method on the Existing Pavement Surface

Chapter 5 Environmental Study

5-1 Introduction

5-2 Description of Existing Environmental Factors

5-2-1 General

5-2-2 Physical and Social Characteristics

5-2-3 Characteristics of Project Area

5-3 Environmental Alteration

5-4 Assessment of Environmental Impacts

5-4-1 Physical Resources

5-4-2 Ecological Resources

5-4-3 Socio-Economic Impacts

5-4-4 Impacts to Human Environment

5-5 Mitigating Measures for Negative Environmental Impacts and Monitoring

5-5-1 General

5-5-2 Air, Noise and Vibration

5-5-3 Flood Protection

5-5-4 Resettlement Management

5-5-5 Crop Compensation

5-5-6 Ecological Resources

5-5-7 Solid Wastes and Sanitation

5-5-8 Monitoring

5-5-9 Underground Facilities

5-5-10 Urbanization

5-5-11 Road Settlement

5-6 Conclusions

Chapter 6 Cost Estimates

6-1 General

6-2 Assumption in the Cost Estimates

6-3 Direct Cost Estimates

6-3-1 Labor Cost

6-3-2 Material Cost

6-3-3 Equipment Cost

6-3-4 Unit Construction

6-4 Construction Quantities

6-5 Right of Way Acquisition Costs

6-6 Maintenance Cost

6-7 Financial Cost

Chapter 7 Economic Evaluation

7-1 Generation

7-2 Benefit Calculation

7-2-1 Quantifiable Benefits

7-2-2 Vehicle Operating Costs

7-2-3 Time Saving

7-2-4 Accident Saving

7-2-5 Stimulation of Regional Economic Development

7-3 Economic Cost Estimates

7-3-1 Financial Cost

7-3-2 Shadow Pricing

7-3-3 Economic Cost Estimates

7-4 Project Evaluation

7-4-1 Method

7-4-2 Investment Schedule

7-4-3 Result of Evaluation

7-4-4 Sensitivity Analysis

Chapter 8 Implementation Program

8-1 General Implementation Arrangements

8-2 Project Implementation Schedule

8-3 Annual Budget Requirement

Chapter 9 Conclusion and Recommendation

9-1 Introduction

9-2 Economic Feasibility

9-3 Recommendations

Appendix A1 Locations of GPS Survey Monuments

Appendix A2 Comparison of Financial Cost and Construction Quantities for Dong Ties
and Uong Bi Bypass Area

Appendix A3 Comparison of Quantities Break Down for Bypass and New Alignment
Sections

Volume II Soils Report

Chapter 1 Introduction

- 1-1 General
- 1-2 Soil Investigation Method
- 1-3 Testing Method

Chapter 2 Engineering Geological Conditions Transportation Network

- 2-1 Geographical Position of the Project Route
- 2-2 Topographical Characteristics
- 2-3 Geomorphic Characteristics

Chapter 3 Geological Characteristics

- 3-1 Tectonic Characteristics
- 3-2 Seismicity
- 3-3 Stratification
- 3-4 Geological Texture of Soft Soil Areas and Main Structures

Chapter 4 Construction Materials

- 4-1 Borrow Pit at Km6+500
- 4-2 Borrow Pit at Km7+850
- 4-3 Borrow Pit at Km16+550
- 4-4 Borrow Pit at Km54+200
- 4-5 Borrow Pit at Km79+010
- 4-6 Hoan Thach Rock Quarry
- 4-7 Yen Cu Rock Quarry (Km65+000)
- 4-8 Ven River-Bed Sand Pit (Km16+000)
- 4-9 Cua Long River-Bed Sand/Gravel (Km60+950)

Chapter 5 Conclusion

Appendix 1 Map

Borehole and Material Sources Location Map near the Project Route

Appendix 2 Relevant Data of Soils Investigation

- Test Pit
- Hand Auger Boring
- Machine Boring
- Borrow Pit
- Measurement of Existing Pavement Thickness

Volume III Drawings

Drawing Schedule	Drawing Number	Number of Sheets
I Location Map	1	1
II Typical Cross Section	2	1
III Plan and Profiles	3—14	12
IV Structures		
Summary of Bridges	15	1
Typical Bridges	16—20	5
V Drainages		
Summary of Box Culverts	21	1
Typical Box Culverts	22	1

7. 越側調査報告書目次 (ノイバイ～バクニン間)(ヴェトナム語原文からの仮訳)

Feasibility Study on Highway No. 18 Improvement Project

Noi Bai-Bac Ninh Section

November 1994

VOLUME I : TEXT

Chapter I Introduction

Chapter II Investment Necessity

II-1 Demand of Passenger and Cargo Transport

II-2 Traffic Analysis of Existing Roads

II-2-1 Road Status

II-2-2 Natural Conditions

2-2-1 Control Points

2-2-2 Geological Conditions

2-2-3 Meteorological and Hydrological Conditions

II-2-3 Major Technical Conditions of Existing Roads

II-3 Condition on Investment Necessity

Chapter III Selection of Alignment and Project Scale

III-1 Basic Principles

III-2 Selection of Alignment

III-3 Project Scale and Specifications

III-3-1 Alignment Significance

III-3-2 Demand Forecast

III-3-3 Technical Criteria Alternatives

III-3-4 Proposals on Technical Criteria and Phased Investment

a. Phase 1

b. Phase 2

Chapter IV Design

IV-1 Procedure and Applied Criteria

IV-2 Geometric Design

IV-2-1 Major Characteristics and Structures

- a. Profile
- b. Longitudinal Alignment
- c. Cross Section
- d. Embankment

IV-2-2 Alternatives of At-grade Railway Crossing

- a. Alternative II
- b. Alternative III

IV-2-3 Socio-Technical Criteria of Investment Alternatives

- a. Alternative II
- b. Alternative III

IV-3 Bridge and Culvert Design

IV-4 Comparison Study on Alternatives (Bridges & Culverts)

IV-4-1 Alternative II

IV-4-2 Alternative III

IV-5 Conclusion and Recommendations

Chapter V Construction Plan

Chapter VI Project Cost Estimate

Chapter VII Investment Effectiveness

Chapter VIII Conclusion-Recommendation-Pending Problems

Annexes for Alternative II

Annex 1 Embankment Area

Annex 2 Table of Slopes and Curves

Annex 3 Volume of Earthwork for each kilometer

Drawings

I General

II Plan, Profile and Cross-section

-Location Map (1 : 100,000)	Code 1	1 sheet
-Geometric Specifications	Code 1A	1 sheet
-Level Plan of Alternative II (Class I)	Code 1B	1 sheet
-Plan of Alternative II (1 : 5,000)	Code 2	3 sheets
-Plan of Alternative II (1 : 2,000)	Code 2	1 sheet
-Profile	Code 3	9 sheets
-Typical Cross Section		1 sheet

VOLUME II : GEOLOGICAL SURVEY REPORT

Volume II-1 : Records of Geological Survey for Roads

1. Text
2. Location Map : Drawing No. 1
3. Boring, Standard Penetration : Drawing No. 2
4. Sections : Drawing No. 3
5. Soil Properties : Drawing No. 4

Volume II-2 : Records of Geological Survey for Bridges

1. Bridge at Km5+995.30 : Drawing No. 1
2. Bridge at Km13+934.30 : Drawing No. 2
3. Bridge at Km19+568 : Drawing No. 3
4. Song Khe Bridge at Km26+880 : Drawing No. 4
5. Bridge at Km5+995.30 : Drawing No. 5
6. Flyover Bridge at Km29+894 : Drawing No. 6

VOLUME III : BRIDGES

1. General
2. Culverts Inventories : Drawing No. 1
3. Culverts Inventories for Alternative III : Drawing No. 2
(Road Class I)
4. Culverts Inventories for Alternative II : Drawing No. 3
(1st Phase of the Phased Investment)
5. Small Bridge Inventory for Alternative III : Drawing No. 4
6. Small Bridge Inventory for Alternative III : Drawing No. 5
7. Small Bridge Inventory for Alternative III : Drawing No. 6
8. Small Bridge Inventory for Alternative II : Drawing No. 7
9. Small Bridge Inventory for Alternative II : Drawing No. 8
10. Small Bridge Inventory for Alternative II : Drawing No. 9
11. Do Lo Bridge General View for Alternative III : Drawing No. 10 (1 : 100)
12. Do Lo Bridge General View for Alternative II : Drawing No. 11 (1 : 100)

13. Nghu huyen Khe Bridge General View for Alternative III : Drawing No. 12 (1 : 100)
14. Nghu huyen Khe Bridge General View for Alternative II : Drawing No. 13 (1 : 100)
15. Flyover Bridge on the Dong Auh-Thain-guyen Railway Line for Alternative III : Drawing No. 14 (1 : 100)
16. Flyover Bridge on the Hanoi-Lang Son Railway Line for Alternative III : Drawing No. 15 (1 : 100)
17. Drawing of Typical RC Bridge (L=21m) : Drawing No. 16 (1 : 50)
18. Drawing of Typical RC Bridge (L=18m) : Drawing No. 17 (1 : 50)
19. Drawing of Typical RC Pipe Culvert : Drawing No. 18 (1 : 50)

SPECIAL REPORT : GEOLOGICAL SURVEY FOR DO LO BRIDGE

JICA

102