Chapter 11

ESTIMATE OF PROJECT COST

CHAPTER 11 ESTIMATE OF PROJECT COST

11.1 General

The Project cost consists of the following components.

- Construction cost
- Engineering cost
- Administration cost
- Land acquisition and compensation cost
- Environmental monitoring cost
- Price escalation
- Physical contingency
- UXO cost
- Interest during construction
- Duty tax

11.2 Estimate of Construction Cost

Construction cost is the sum of the cost for various items of work required in the construction.

These individual costs are the product of a calculated quantity of an item of work multiplied by the estimated unit cost of the item.

11.3 Direct Cost

The unit cost of each item was obtained by totaling the labor cost, material cost, equipment operation cost, etc. It is expressly acknowledged that the pricing method and data for construction cost estimation were based on the internationally accepted competitive bidding practice that is virtually non-existent in Viet Nam at present moment.

The Study Team tried to use the estimate method based on a similar project in Japan. Accordingly, the estimate method is based on the Estimate Standard for Civil Work of Ministry of Construction in Japan 1999. The data was adjusted considering the respective socio-economic realities in the two countries.

11.3.1 Labor Cost

Labor cost is calculated based on the relevant regulations for labor in Viet Nam as follows:

- Decree 25/CP and 26/CP dated May 23 1993 of Government concerning the new wage policy.

- Labor law of the Socialist Republic of Vietnam dated June 23 1994.
- Decree 197/CP dated December 31 1994 of Government concerning the wage for the Vietnamese labor working for Enterprise finance by foreign funding.
- Guideline to tabulate "General cost estimate" No 08/1999/TT-BXD dated November 16 1999.
- Circular 07/LDTBXH-TT dated April 11 1995 Guide to implementation the Articles Labor Law's dated June 23 1994 and Decree 195/CP December 31 1994 of Government about Working time and Rest time.
- Circular 11/LDTBXH -TT on May 3 1995 of Ministry Labor & War Invalid Social Affairs to guide the implementation of the Decree 197/CP of Government.
- Circular 39TC/TCT of Finance Ministry guide to implement the Decree05/CP dated January 1 1995 and Decree 30/CP dated April 5 1997 of the Government about Income Tax.
- Decree 708/LDTBXH- QD dated June 15 1999 of the Ministry labor &War Invalid Social Affairs about the minimum wage level for the Vietnamese Labor working for Enterprise finance by foreign funding.
- Circular 19/LDTBXH-TT dated July 2 1993 Guide to implemented the regulation subsidy mobile allowance.
- Circular 4076/ LDTBXH-TT dated November 29 1993 applied regulation mobility allowance.

In some construction items for which a specialty is required, labor cost was estimated based on the Price List for Construction in Japan, July 1999, as experienced labor.

11.3.2 Material Cost

Material costs are estimated based on the quotations of some suppliers in Viet Nam.

Material impossible to be procured in Viet Nam were estimated based on quotations of suppliers of foreign countries or the Price List for Construction in Japan, July 1999, as the imported material.

11.3.3 Equipment Operation Cost

Equipment operation cost includes depreciation cost, repair-maintenance cost, management cost, and operation cost. These were estimated based on Vietnamese Standard (1260/1998/QN-BXD).

The other equipment not indicated in Vietnamese Standard was calculated based on the quotations or the Calculation Table for Depression of Civil Work Equipment in Japan, 1999.

11.3.4 Quantity

The quantities for all work items is calculated based on the prepared engineering drawings for the construction.

11.4 Indirect Cost

Indirect cost in the construction cost includes common temporary cost, site office expense and head office expense.

11.5 Other Indirect Cost

11.5.1 Engineering Cost

The Engineering cost includes consultant fee for pre construction and construction supervision stages. Those are estimated as the multiplied result of unit price and quantity. Unit price and quantity of each item are referred to other international bidding projects.

11.5.2 Administration Cost

The administration cost was estimated referred to the letter No.2889/GTVT/CGD issued by Ministry of Transport, Socialist Republic of Viet Nam on 30th August 2000.

11.5.3 Land Acquisition and Compensation Cost

Land acquisition and compensation cost was estimated based on the letter No.2889/GTVT/CGD issued by Ministry of Transport, Socialist Republic of Viet Nam.

11.5.4 Environmental Monitoring

Environmental monitoring fee during construction phase and operation phase after the construction was derived from the EIA study result.

11.5.5 Price Escalation

Price escalation was calculated referred to other international bidding project. The applied rate was 0.8% for foreign currency portion and 0.1% for local currency portion.

11.5.6 Physical Contingency

Physical contingency is calculated as 5% of the construction cost. This ratio is referred to other international bidding project.

11.5.7 UXO Cost

UXO cost is required for the site cleaning up of unexploded bombs. UXO cost is estimated based on the letter No.2889/GTVT/CGD issued by Ministry of Transport, Socialist Republic of Viet Nam.

11.5.8 Interest during construction

Interest rate is calculated with 1.6% per year for both of foreign and local currencies. Interest during construction is estimated as multiplied result of the cumulative construction progress schedule and interest rate.

11.5.9 Duty tax

Duty tax is estimated as 10% of construction cost with referring to the other international tendering projects. This percentage includes the import tax and VAT

11.6 Construction Cost of Resettlement Area (Package 4 & 5)

The construction cost for the resettlement was estimated based on Viet Nam standard. These construction packages will be tendered in local bidding. Accordingly, the calculation method, labor cost, material cost and equipment cost are based on the regulations for cost estimate in Can Tho province and Vinh Long province.

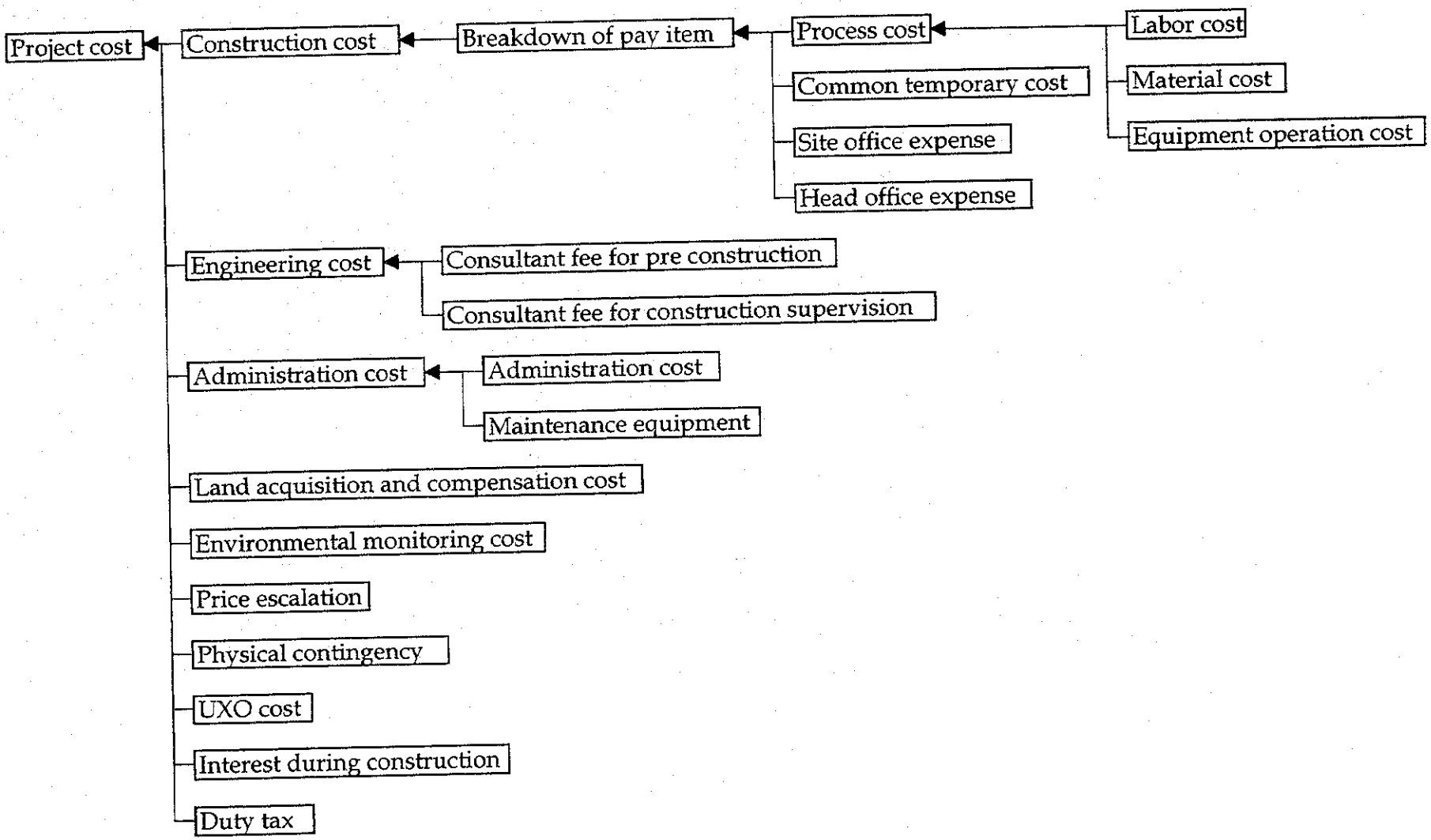


Figure 11.1 Diagram of Cost Estimate

11.7 Project Cost

11.7.1 Project cost (Package 1, 2 & 3)

1.	Construction cost	:	28,726,000,000	JP Yen
	(Package-1)	:	(2,800,000,000	JP Yen)
	(Package-2)	:	(22,394,000,000	JP Yen)
	(Package-3)	:	(3,532,000,000	JP Yen)
2.	Engineering cost (consultant)	:	1,721,000,000	JP Yen
3.	Administration cost			
	3.1 Administration cost	:	621,000,000	JP Yen
	3.2 Maintenance equipment	:	216,000,000	JP Yen
4.	Land acquisition and compensation cost	:	1,158,000,000	JP Yen
5.	Environmental monitoring	:	22,000,000	JP Yen
6.	Price escalation	:	587,000,000	JP Yen
7.	Physical contingency	:	1,466,000,000	JP Yen
8.	UXO cost	:	86,000,000	JP Yen
9.	Interest during construction	:	1,155,000,000	JP Yen
10.	Duty Tax	:	2,873,000,000	JP Yen
	Total (Project cost)	:	38,631,000,000	JP Yen

11.7.2 Project cost (Package 4 & 5)

1.	Construction cost	:	230,000,000	JP Yen
2.	Environmental monitoring	:	4,000,000	JP Yen
3.	Contingency (Physical contingency)	:	23,000,000	JP Yen
4.	UXO cost	:	2,000,000	JP Yen
	Total (Project cost)	:	259,000,000	JP Yen

(1US$=108JP Yen=14,100VND)

Chapter 12

PREPARATION OF PREQUALIFICATION AND TENDER DOCUMENTS

CHAPTER 12 PREPARATION OF PREQUALIFICATION AND TENDER DOCUMENTS

12.1 Prequalification Documents

The documents of prequalification cover general information about the contractor, legal and financial information and technical information, to include previous experience on similar projects, key personnel to be assigned to the project and list of minimum essential equipment required. The detailed contents prepared are as follows:

- Invitation to apply for prequalification
- General instructions to applicants for prequalification
- Particular instructions to applicants for prequalification
- Appendix- A: Preliminary project details for package
- Appendix- B: Schedule for all 5 packages
- Application letter and forms

12.2 Evaluation of Prequalification

The detailed method of evaluation is included in the appendices of this report. The results of the prequalification evaluation will be summarized in a report recommending contractors for short-listing. The report will also include a list of disqualified contractors specifying the reasons for their disqualification. Short-listed contractors will be notified on the availability of the bidding documents.

12.3 Tender Documents

The tender documents will be issued by the PMU My Thuan and consist of:

(1) Volume 1

a) Invitation to Tender and Forms of Acknowledgment

b) Project Definition

c) Conditions of Tendering

d) Appendix A to Conditions of Tendering, Information provided by PMU My Thuan.

- Schedule Co T - 1	Working and Accommodation Areas
- Schedule Co T - 2	Survey Data
- Schedule Co T - 3	Geotechnical Data

- Schedule Co T - 4 Environmental Data

e) Appendix B to Conditions of Tendering. Major Points of Conformance

f) Form of Tender

g) Appendix to Form of Tender

h) Schedules to Form of Tender, Information to be completed by Tenderer

- Tender Schedule TS - 1 Management System and Project Organization
- Tender Schedule TS - 2 Curriculum Vitae of Proposed KeyStaff
- Tender Schedule TS - 3 Details of Staff, Labor and Training
- Tender Schedule TS - 4 List of Proposed Contractor's Equipment
- Tender Schedule TS - 5 Proposed Construction Working Hours
- Tender Schedule TS - 6 Details of Proposed Engineering Services
- Tender Schedule TS - 7 Details of Any Joint Venture, Joint Participation or Consortium Partners
- Tender Schedule TS - 8 Details of Major Subcontractors and Suppliers
- Tender Schedule TS - 9 Sources of Materials
- Tender Schedule TS - 10 Detailed Proposed Program for Construction
- Tender Schedule TS - 11 Details of Proposed Construction Method Statement
- Tender Schedule TS - 12 Schedule of Priced Bill of Quantities

- Tender Schedule TS – 13 Schedule of Rates for Daywork
- Tender Schedule TS – 14 Schedule of Rates for Overheads and Profit
- Tender Schedule TS – 15 Estimated Monthly Cash Flow
- Tender Schedule TS – 16 Details of Insurances
- Tender Schedule TS – 17 Details of Proposed Quality System
- Tender Schedule TS – 18 Safety Plan
- Tender Schedule TS – 19 Environmental Management Plan
- Tender Schedule TS – 20 Details of Existing Services
- Tender Schedule TS – 21 Details of Contractor's Compound
- Tender Schedule TS – 22 River and road traffic management Plan
- Tender Schedule TS – 23 Form of Tender Security

i) Form of Agreement

j) Conditions of Contract Part I (FIDIC IV, 1992)

k) Conditions of Contract Part II (Special Condition)

l) Preamble to the Schedule of Prices and Rates

m) Forms of Bank Guarantees

- Advance Payment Security
- Performance Security

(2) Volume 2

a) Technical Specifications

(3) Volume 3

a) Drawings

(4) Volume 4

a) Additional Geotechnical and survey Information

b) Additional other information e.g.

- Feasibility Study Annexure
- Basic Design Report
- Final Design Report
- Final Report on River Studies
- Final Report on Wind Tunnel Tests
- Report on Land Resumption and Survey

The documents issued to tenderers do not include a copy of the general conditions of contract. Tenderers should make their arrangements for obtaining a copy, which is available from FIDIC.

12.4 Brief of Each Document

(1) Invitation to Tender and Forms of Acknowledgment

This is a letter from PMU to the selected tenderers. It contains an outline of the tendering process and the Project itself. It also contains the dates and names of individuals associated with the process. The reason for this is that we can then change the details until the last minute without having to rebind the whole document.

The proforma response for the tenderers to confirm they will be tendering. It has no legal standing but alerts the team if a prequalified will not bid an alternative can be invited.

(2) Project Definition

Describes the project in writing with a limited number of sketches. Identifies design standards. Also gives a tentative schedule for implementation.

(3) Conditions of Tendering

Sets out the basis upon which tenderers must bid, e.g. currency, securities, how to complete the tender schedules. Describes the tender documents. Tells the tenderers how we will evaluate the tenders. Reserves the right to not select any or all tenderers (important legally).

(4) Appendix to the Conditions of Tendering

Gives supporting information to help tenderers to prepare their tender, e.g. working areas, survey data, geo-technical data, and environmental data.

(5) Appendix to Conditions of Tendering, Information Made Available by PMU My Thuan

Sets out the major points of conformance to warn tenderers that even if their tender has a very tempting price, if it does not comply with some very important conditions we will not look at it further. Conditions include that security is enclosed and that tenderer shows a clear understanding of the issues.

(6) Form of Tender

This is the tenderer's formal offer. In it he effectively states that he accepts the conditions of tendering.

(7) Appendix to the Form of Tender

Sets out project specific data but not the sort that might change at the last minute (which is in the Letter of Invitation). Includes things like the amount of the security, the length of the construction period, amount of liquidated damages.

(8) Schedules to the Form of Tender, Information to be completed by the Tenderer

This is where we identify what information we want them to provide with their tender. It includes thing like the rates or prices for each item, his proposed site management structure, CV's of his proposed people, his proposed program, his proposed method statement, his proposed environment management plan, his proposed quality system.

We also tell tenders what the wording of the tender security must be (our tight works not his perhaps loose ones).

This is where we find out at the evaluation stage whether he has a clear understanding of the problems. We also get as detailed a breakdown of his price as we think we might need to evaluate variations during the works. We also use these in evaluation to check what the overall evaluated price will be of each tenderer taking into account possible variations, tenderers' proposed cash flow, etc.

(9) Form of Agreement

This tells tenderers what the eventual contractor will have to sign as the formal contract.

(10) Conditions of Contract Part I General Conditions

This is FIDIC without modifications.

(11) Conditions of Contract Part II General Conditions

This is where we modify FIDIC by either adding to it (good examples are about an advance payment or, more mundanely, what we expect him to do for his labor - does he have to provide a clinic and ambulance on site or, in Tokyo or Melbourne just first aid and a procedure for calling a public emergency ambulance).

We also change bits in FIDIC to perhaps put risk off the employer onto the contractor (an example of this proposed for Can Tho is that unexploded ordnance is to be screened by the contractor and that as a consequence, damage from UXO is not a "Special Risk" that FIDIC normally says is the Employer's responsibility.

12.5 Evaluation of Tenders

The objective in evaluating tenders is to obtain the best value for money and not necessarily the lowest price. In addition to the consideration of price and compliance with the tender documents, the following factors will be taken into consideration in the assessment of tenders. The detailed method of evaluation is included in Appendices of this report.

- Technical management, physical and financial resources
- Subcontract, labor and material supply proposals
- Extent of local contractor participation
- Current commitments
- Record of previous performance on projects both in Japan and overseas
- Reputation within the industry
- Extent of construction experience on similar projects
- Ability to perform within contract time
- Financial capacity
- Quality system proposals and quality assurance record
- Industrial relations, safety performance and contract claims record
- Pricing structure of tender schedules
- Extent of minimization of risk to the government of Viet Nam

Chapter 13

IMPLEMENTATION PROGRAMME

CHAPTER 13 IMPLEMENTATION PROGRAMME

13.1 Project Outline

13.1.1 Project Location

- Project Location : 3.2km downstream from the existing ferry line

13.1.2 Project Length

- Project Length : 15,850m

13.1.3 Bridge Feature

- Total Bridge Length : 2,750m
- Main span bridge : 1,090m
- Vinh Long side approach span bridge : 480m
- Can Tho side approach span bridge : 1,180m
  (Including 180 m of the sub stream bridge)
- Bridge Width (4 - lane carriageway) : 23.1m

(1) Main Span Bridge

- Superstructure Type : Hybrid (Steel and Prestressed Concrete) Cable-Stayed Girder
  2@70m + 130m + 550m + 130 m + 2@70m = 1,090 m
- Foundation Type : Cast in place RC Pile

(2) Approach Span Bridges

Vinh Long Side

- Superstructure Type : Connected PC I Girder
  12 @ 40.0m = 480m
- Foundation Type : Cast in place RC pile

Can Tho Side

- Superstructure Type : Connected PC I Girder 19 @ 40.0m = 760m
  Prestressed Concrete Cantilever Box
  50m + 3 @ 80+ 50m = 340m
  Connected PC I Girder
  2 @ 40.0m = 80m

Total : 1,180m

- Foundation : Cast in place RC Pile.

13.1.4 Approach Roads

(1) Road Length

- Total Length : 13,100 m
- Vinh Long Side : 5,410 m
- Can Tho Side : 7,690 m

(2) Intersections (Interchanges)

- Vinh Long Side : Semi-Y Type (NH. 1)
  Diamond Type (NH. 54)
- Can Tho Side : Diamond Type (NH.91B)
  3 – Branch Intersection (NH.1)

(3) Service Area

- Vinh Long Side : 21,000 m^2
- Can Tho Side : 21,000 m^2

(4) Toll Gate and Management Office : 1 Location

13.1.5 Construction Period

- Package-1 (Approach Road on Vinh Long side) : 47 months
- Package-2 (Main & Approach Span Bridges) : 55 months
- Package-3 (Approach Road on Can Tho side) : 50 months

13.2 Project Packaging

The appropriate size of contract of the Project were recommended for implementation under the JBIC Guideline, taking into consideration of the following items:

- Proper size in consideration of cost requirements
- Proper size from the point of view of technical content for the selection of the civil works contractor
- Proper size and location from the point of view of handling by municipality, in case of domestic tender
- Minimizing the number of construction yards and offices

- Minimizing the organization and staff to be required
- Unified control for the construction quality and progress
- Maintaining effective communication system

The project packaging can be tentatively scheduled in accordance with the meeting held on 13 October 1999 in Hanoi as below:

- Package - 1: Approach Road Section for Vinh Long side
- Package - 2: Main Span and Approach Span Bridges
- Package - 3: Approach Road Section for Can Tho side
- Package - 4: Infrastructure and Facility for Vinh Long side
- Package - 5: Infrastructure and Facility for Can Tho side

Package-4&5 will be funded by the domestic resource with considering the early commencement of other packages, and scheduled to be tendered in local bidding. For facilitating the Project, PMU My Thuan submitted the application of the "Implementation Schedule and Cost Estimate of the Land Acquisition and the Resettlement Areas of Can Tho Bridge Project" including the design of Package-4&5 to Ministry of Transport by on 6th March 2000. The Minister of MOT approved this application on 28th April 2000 with the official letter, No.1042/QD-GTVT.

13.3 Tentative Implementation Schedule

Major Timings of the tentative implementation Schedule are as shown in the following:

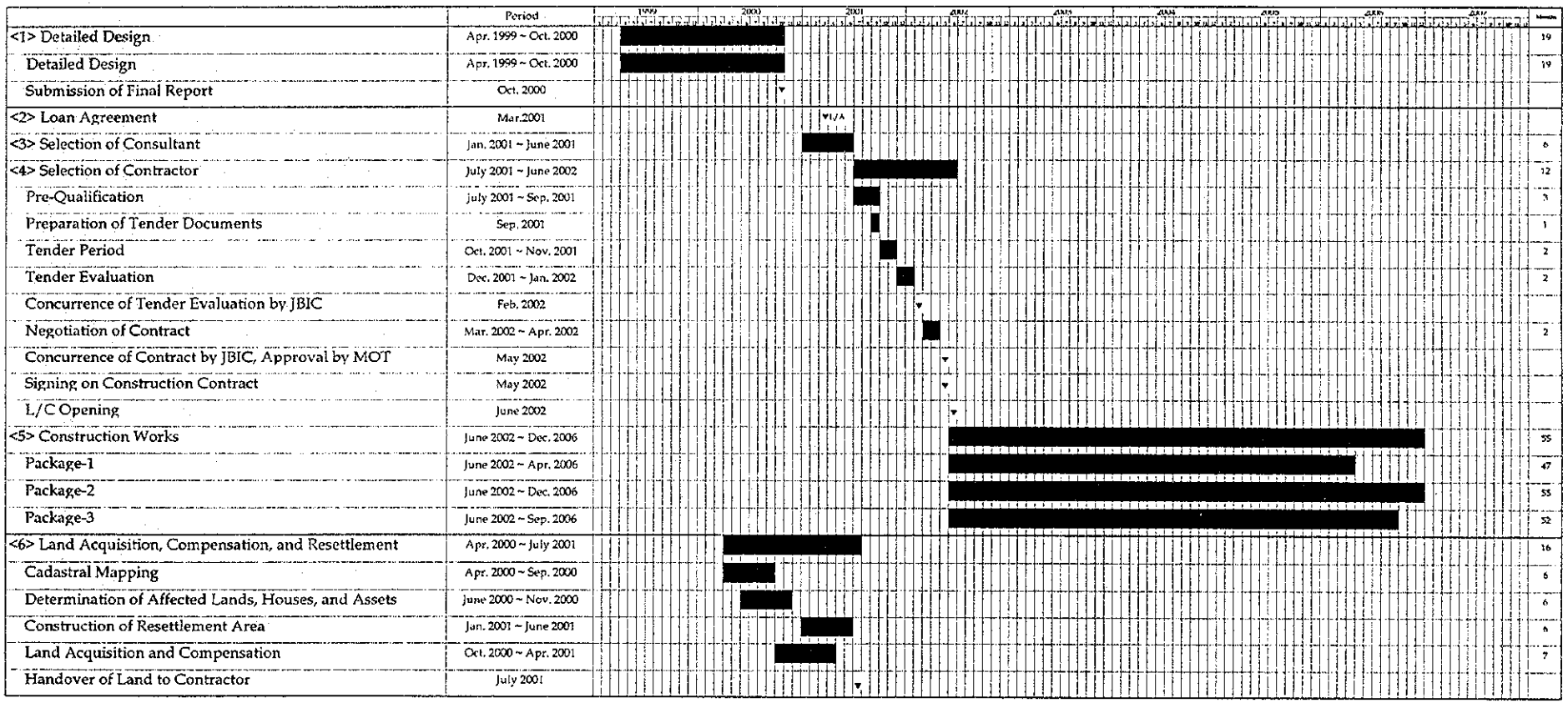
- The Detailed Design will be accomplished by October 2000
- Land acquisition including resettlement for people to be removed should be started from April 2000.
- Selection of Consultant will be from January 2001 to June 2001
- Pre-qualification will be from July 2001 to September 2001
- Tendering is from October 2001 to June 2002
- Commencement of Construction will be June 2002

13.4 Implementation Procedures

The implementation procedures of the Project under JBIC Guideline will be the following series of activities.

- Loan Commitment (L/C)
- Loan Agreement (L/A)
- Invitation of Consultant for Detailed Design
- Detailed Design (Tender Design), including Tender Documents
- Pre-Qualification of Contractors
- Approved by MOT (Ministry of Transport, Viet Nam)
- Approved by JBIC (Japan Bank for International Cooperation)
- Issuance of Tender Documents
- Site Visit (Orientation)
- Pre-Bid Conference
- Submission of Bid (Tender Close)
- Opening Bids
- Bid Evaluation
- Approved by MOT
- Approved by JBIC
- Negotiation with Contractor
- Notice of Award
- Construction Contract Agreement
- Approved by MOT
- Approved by JBIC
- Notice to Proceed
- Commencement of Works

The tentative implementation schedule is shown in Figure 13.1.



	Period	Months
<1> Detailed Design	Apr. 1999 ~ Oct. 2000	19
Detailed Design	Apr. 1999 ~ Oct. 2000	19
Submission of Final Report	Oct. 2000	
<2> Loan Agreement	Mar.2001	
<3> Selection of Consultant	Jan. 2001 ~ June 2001	6
<4> Selection of Contractor	July 2001 ~ June 2002	12
Pre-Qualification	July 2001 ~ Sep. 2001	3
Preparation of Tender Documents	Sep. 2001	1
Tender Period	Oct. 2001 ~ Nov. 2001	2
Tender Evaluation	Dec. 2001 ~ Jan. 2002	2
Concurrence of Tender Evaluation by JBIC	Feb. 2002	
Negotiation of Contract	Mar. 2002 ~ Apr. 2002	2
Concurrence of Contract by JBIC, Approval by MOT	May 2002	
Signing on Construction Contract	May 2002	
L/C Opening	June 2002	
<5> Construction Works	June 2002 ~ Dec. 2006	55
Package-1	June 2002 ~ Apr. 2006	47
Package-2	June 2002 ~ Dec. 2006	55
Package-3	June 2002 ~ Sep. 2006	52
<6> Land Acquisition, Compensation, and Resettlement	Apr. 2000 ~ July 2001	16
Cadastral Mapping	Apr. 2000 ~ Sep. 2000	6
Determination of Affected Lands, Houses, and Assets	June 2000 ~ Nov. 2000	6
Construction of Resettlement Area	Jan. 2001 ~ June 2001	6
Land Acquisition and Compensation	Oct. 2000 ~ Apr. 2001	7
Handover of Land to Contractor	July 2001	

Figure 13.1 Tentative Implementation Schedule of Can Tho Bridge Construction

Chapter 14

FINANCIAL ANALYSIS

CHAPTER 14 FINANCIAL ANALYSIS

14.1 Cost Disbursement

The project cost disbursement schedule is shown in Table 14.1. After the year 2006 maintenance and operation costs become constantly necessary for each year.

Table 14.1 Disbursement Schedule

1. Packages 1, 2 & 3 (unit: 1,000 JP¥)

		2000	2001	2002	2003	2004	2005	2006	2007	-	2026	Total
1	Land Acquisition & Compensation	1,257,950	103,490	0	0	0	0	0	0	-	0	1,361,440
2	UXO Cost	93,877	7,723	0	0	0	0	0	0	-	0	101,600
3	Administration Cost	0	0	42,917	260,603	355,744	220,013	105,482	0	-	0	984,759
4	Consultant Fee	34,931	25,616	72,191	439,666	600,116	370,852	178,032	0	-	0	1,721,404
5	Environmental Monitoring	0	0	1,079.5	6,731	9,207.5	5,651.5	2,730.5	0	-	0	25,400
6	Construction Work	0	0	1,320,666	8,118,883	10,987,512	7,359,530	3,865,408	0	-	0	31,651,999
	- Pckage 1 (App. Road Vinh Long)	0	0	294,645	1,258,941	1,411,230	243,184	0	0	-	0	3,208,000
	- Pckage 2 (Main and App. Span bridge)	0	0	898,318	5,766,573	7,699,855	6,218,033	3,795,221	0	-	0	24,378,000
	- Pckage 3 (App. Road Can Tho)	0	0	127,703	1,093,369	1,876,427	898,313	70,187	0	-	0	4,065,999
7	Price Escalation	0	0	12,917	121,201	217,796	198,174	78,737	0	-	0	628,825
8	Physical Contingency	0	0	66,679	412,004	560,265	377,885	197,207	0	-	0	1,614,040
9	Tax Duty	0	0	132,067	811,888	1,098,751	735,953	386,541	0	-	0	3,165,200
10	Maintenance	0	0	0	0	0	0	0	31,700	-	31,700	634,000
11	Operation	0	0	0	0	0	0	0	12,009	-	12,009	240,180
	Total	1,386,758	136,829	1,648,517	10,170,976	13,829,392	9,268,059	4,814,138	43,709	-	43,709	42,128,847

2. Package 4 & 5 (unit: 1,000 JP¥)

		2000	2001	2002	2003	2004	2005	2006	2007	-	2026	Total
1	Land Acquisition & Compensation	0	0	0	0	0	0	0	0	-	0	0
2	Pre-Construction Work	3,000	0	0	0	0	0	0	0	-	0	3,000
3	Construction Supervision	0	0	0	0	0	0	0	0	-	0	0
4	Administration	0	0	0	0	0	0	0	0	-	0	0
5	Environmental Monitoring & Countermeasures	2,000	2,000	0	0	0	0	0	0	-	0	4,000
6	Construction Work (Package 4, 5)	68,280	204,839	0	0	0	0	0	0	-	0	273,118
7	Contingency	27,312	0	0	0	0	0	0	0	-	0	27,312
8	Maintenance	0	0	0	0	0	0	0	0	-	0	0
9	Operation	0	0	0	0	0	0	0	0	-	0	0
	Total	100,591	206,839	0	0	0	0	0	0	-	0	307,430

Note: As of 15.Sep.2000

Source: JICA Study Team

14.2 Financial Analysis

14.2.1 Analytical Aspects

It was assumed that the Can Tho Bridge will be operated as a toll bridge same as the My Thuan Bridge. Namely, it is supposed that charges are to be collected from users of the bridge and these revenues will be allocated to the repayment of the loan and pay back to the capital for project investment and to meet the costs for operation and maintenance of the bridge.

The characteristics of the Project from the viewpoint of financial analysis are following.

- Large amount of investment fund will be required for the Project including relevant and subsidiary works.
- The benefits of the Projects will last for a long time.
- Large foreign currency portion will be included in the Project costs.

Therefore, favorable foreign loan such as JBIC ODA Loan is preferable for the fund procurement.

Considering circumstances mentioned above, financial analysis was made to acquire the clear prospects on following basic primary questions.

1) Viability of the Project under favorable ODA loaning condition;
2) Viability of the Project under the financing condition of long and short term loan without subsidy;
3) Possibility of covering operation and maintenance costs by revenue from the Bridge operation as an autonomous project; and
4) Possible measures to enhance the financial soundness of the Project.

The factors for the financial analysis are classified into two groups, cost related and revenue related (Figure 14.1).

The total project costs including operation and management cost and disbursement schedule were determined from the engineering aspect. Those were regarded as given conditions. The loaning condition of JBIC ODA loan is advantageous compared with other loaning scheme provided by international organizations. In this Study the conditions for JBIC ODA loan are regarded as primary premises in the analysis.

The major factors dominating the financial indicators are following:

1) Packaging of Project elements to be funded by ODA loaning,
2) Funding plan for the project costs not to be covered by ODA loan, and

3) Revenue plan by toll charge.

Regarding the packaging, costs for the packages 4 and 5, the relevant construction work, were estimated to be considerably small compared with the costs for package 1, 2 and 3. The influence by those costs seems small, however those costs were basically included in the financial analysis from the viewpoint of full cost recovery.

In the financial analysis several cases were examined for identifying the influence on the viability and soundness of the Project by those factors.

ex. - different fare level cases to consider the rationale of the fare level
- different traffic demand forecast cases to clarify the Project viability

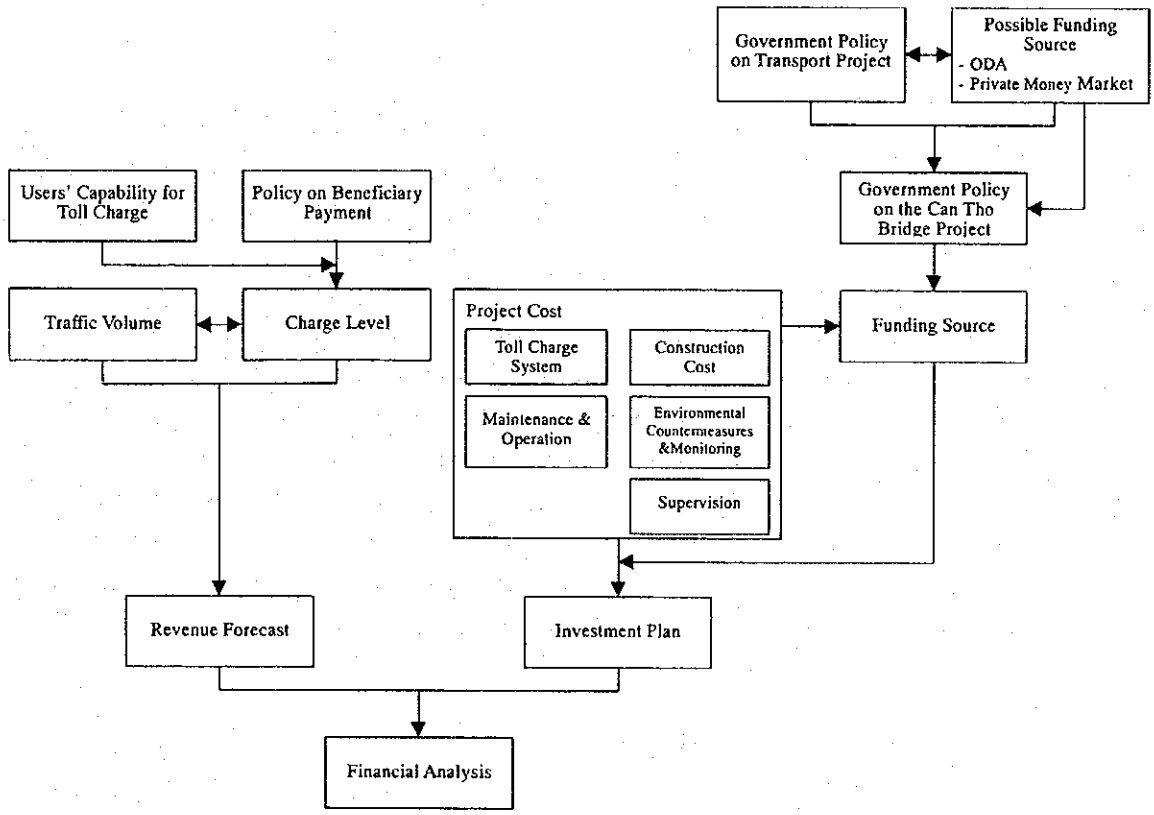


Figure 14.1 Approach to the Financial Analysis

14.2.2 Revenue

The estimate of total revenue can be calculated by multiplying charges for each vehicle type by traffic volume.

For the public services which is monopolistically provided in the market and the supply of which is officially restricted, the principles for the determination of charge level are generally the following.

a) marginal cost pricing principle
b) average cost pricing principle

Bridge project can be characterized that the portion of investment on fixed assets is considerably large, and marginal cost is small compared to total project cost because it mainly comprises direct costs for maintenance and administration. Therefore, marginal cost of bridge is almost negligible so far as traffic volume is within its capacity.

Generally the latter principle is adopted for toll roads and bridges in the world.

In Viet Nam also, average cost principle is recommendable because of the financial situation, insufficient funding resources in the transport sector.

Details on the determination of toll rates are discussed later.

In this Study referring to the present ferry, toll bridge, and toll road charges in Viet Nam, present charge level of Can Tho ferry was set as a baseline, and it was raised up to 2.0 times higher than present charge level with an interval of 0.5 times.

It is well likely that charge level will affect traffic volumes and total revenue, therefore information on the demand elasticity with respect to charge level is necessary. Elasticities are supposed rather small for the traffic demand crossing the Hau Giang River near Can Tho because no convenient river-crossing transport means are provided in nearby areas. Most river-crossing traffic will be forced unavoidably to pass the bridge. In the F/S on the Can Tho Bridge Project the following price elasticities were adopted. Based on these elasticities future traffic demand corresponding to the different charge levels were estimated. (Table 14.2).

Normal traffic	-0.1
Diverted traffic	-0.3
Induced traffic	-0.5

It is empirically unnatural that charge level will remain unchanged. With the increase in future users' benefits by the bridge, revision of toll rates is well persuasive. Also with the increase in maintenance and operation costs, revision of toll rates become justifiable. However, the revision of charge level influences favorably on the feasibility of the project, and the forecast of price escalation in a long spun is rather difficult. Revision of toll rates was not adopted in this Study to prove the Project to be feasible under severe conditions.

Forecast revenues are shown in Table 14.3. The revenues after 2026 were assumed constant because of the uncertainty of the traffic demand and for financial analysis on the safe side. The estimate showed that the revenue would increase by 70% if the charge was doubled.

Table 14.2 Traffic Forecast at Can Tho Brdge

2010

		MC	PC	LB	HB	LT	MT	HT	Total
Total	(veh./day)	22,281	5,139	2,051	898	1,721	4,175	397	36,662
Normal & development traffic	(veh./day)	15,777	4,577	1,822	810	1,606	3,897	194	28,683
Induced traffic	(veh./day)	6,504	562	229	88	101	208	12	7,704
Diverted traffic	(veh./day)	0	0	0	0	14	70	191	275

2015

		MC	PC	LB	HB	LT	MT	HT	Total
Total	(veh./day)	35,947	9,552	3,236	1,366	3,340	8,077	725	62,241
Normal & development traffic	(veh./day)	25,375	8,482	2,872	1,231	3,110	7,539	368	48,976
Induced traffic	(veh./day)	10,572	1,070	364	135	206	418	24	12,788
Diverted traffic	(veh./day)	0	0	0	0	24	121	333	477

2020

		MC	PC	LB	HB	LT	MT	HT	Total
Total	(veh./day)	49,612	13,965	4,420	1,834	4,958	11,978	1,053	87,820
Normal & development traffic	(veh./day)	34,972	12,387	3,922	1,652	4,614	11,180	542	69,269
Induced traffic	(veh./day)	14,640	1,578	498	182	311	627	36	17,872
Diverted traffic	(veh./day)	0	0	0	0	33	171	475	679

Source: JICA Study Team

Note: Charges for each vehicle type were determined by weighted average of charges for each sub-vehicle type in 2000.

Table 14.3 Revenue from Bridge Charges

(Unit: mil. JP¥)

		2010	2015	2020
Case R1				
ferry fare level				
(m=1.0)	(mil.JPY/year)	1,140.92	2,071.01	3,001.11
Case R2				
than existing fare level				
(m=1.5)	(mil.JPY/year)	1,585.97	2,880.87	4,175.77
Case R3				
existing ferry fare level				
(m=2.0)	(mil.JPY/year)	1,947.41	3,540.29	5,133.17

Source: JICA Study Team

14.2.3 Costs

In addition to the construction costs, costs related to the toll collection system are required for the financial cost estimate in the case of a toll bridge. Costs related to toll collection system comprises those for operation, facilities, equipment and taxes. Taxes on the revenue were not included in the financial analysis in consideration of the possibility of exemption for social infrastructure.

As for the construction costs including costs for environmental countermeasure, maintenance, the results estimated in chapter 11 were used in the financial analysis.

Costs for facilities and equipment related to the toll system were already estimated in Chapter 11. Equipment cost varies depending on the toll collection system.

The costs for operation system are mainly composed of personnel expenditure and maintenance costs for toll system. Personnel expenditure was determined based on the survey results of current salary level and cost for equipment of Can Tho ferry Company (Table 14.4). Maintenance cost for toll system was assumed 10% of personnel expenditure. Installation of semi-automatic collection system at the cost of 63.5 million. JPY was assumed. Compared with yearly maintenance costs of bridge and road itself, the cost for operation of toll collection system was estimated at nearly one-third level.

Table 14.4 Personnel Expenses for Toll Bridge Operation

Work Type	Number of Staffs	Yearly Expense (1,000JPY/year)
Manager	1	533
Assistant Manager	1	457
Administrative Staff	3	1,143
Technical Staff	4	1,524
Fare Collection Staff	24	4,389
Kitchen Service Staff	2	305
Controller	6	1,097
Accountant	4	732
Guard	8	1,829
Total	53	12,009

Source: JICA Study Team

14.2.4 Financial Analysis

Viability of the Project highly depends on the construction costs, charges, and funding condition. Therefore study cases are established by assuming the possible variations of those factors to meet the scope of the financial analysis.

1) Conditions for financial evaluation

The basic conditions for financial analysis are stated below.

a) Base year

The beginning year of the Project, namely the year 2000 was set as a base year for the financial evaluation.

b) Evaluation period

A 30-year period after opening was assumed as an evaluation period. Since the construction work is to be completed in 2006, the evaluation period is from 2007 to 2036.

c) Prices

All prices are expressed as current 1999 market prices.

d) Inflation

No inflation rate was adopted for revenues and costs.

e) Interest rate

In Viet Nam different interest rates are observed according to the currency, and a real interest rate was assumed less than 10%.

An annual rate of interest for decades was assumed to be 8% in Viet Nam.

f) Depreciation

Following depreciation periods were assumed.

-	bridge	50 years
-	building	50 years
-	quipment for charging system	10 years

g) Salvage value

10% of initial cost was assumed.

A 30-year evaluation period was set only for the purpose of financial analysis, whereas bridge and other facilities will remain and operated after 2036. Therefore, remaining value of assets, or salvage value was added to the cash flow of investment as a minus cost in the last year of the evaluation period. A straight line method with salvage value of 10% of initial cost after 50 years of depreciation period was applied to the each capital investment.

h) Taxes

In January 1999, enterprise income tax and value added tax will be introduced in Viet Nam.

However, according taxation system in Viet Nam, presently ferry and bridge operation station are regarded as an non-profitable business. It was assumed that total expenditure will be subtracted from total revenue of those organizations, and then total of the rest will be put into state budget without paying tax. So no consideration was made for paying the income tax and value added tax in the financial analysis.

i) Loans

For the financial analysis the following three kinds of loan were assumed available.

i) long term loan

- interest rate 1.8% a year
- grace period 10 years
- repayment period 30 years

ii) short term loan

- interest rate 8 % a year
- repayment period 1 year

A long term loan is expected to cover up to 85% of the Project costs in combination with government subsidy or other resources to supplement the remaining Project costs. Details of the loaning conditions of the long term loan are shown in the text box. The

conditions are same as those of JBIC ODA Loan. A short term loan is assumed to have no constraint for loaning like a long term loan.

Cash outflow is allocated to the construction costs during the construction period, maintenance and administration costs, pay back of the long term loan. When surplus cash is generated, it is allocated to pay back of the short term loan, if any.

j) Evaluation indicators

As evaluation indicators, discounted cash flow (DCF) investment pay back period, Return on Investment (ROI), and Net Present Value (NPV) were calculated.

Details of Long Term Loan

1. Loan Condition:
   1) Construction Cost
      a) Present interest rate 1.8%
      b) Return period (included grace period) 30 years (10) years
   2) Consulting Fee
      a) Present interest rate 1.8%
      b) Return period (included grace period) 30 years (10) years
         * If Loan Agreement is made in 2000, the first year of repayment will be 2010.
         * During the grace period Borrower is obliged to repay for the interest.

2. Items for Loaning
   Items eligible for loaning are following.
   1) Costs for civil work, and construction work
   2) Cost for consulting fee
   3) Costs for utilities for the project
   4) Costs for infrastructure at relocation site for residents
   5) Cost for interest of ODA Loan during construction
      * Approach roads, culverts, agricultural discharge water channel are included in the civil work and construction work.
      * Costs for utilities include tollgates, communication facilities (telephone, etc.), vehicles for operation and management. Electric power supply facilities are excluded.
      * Costs for infrastructure at relocation site include those for water supply, electricity supply and sewerage facilities.

   Items ineligible for loaning are following.
   1) Costs for taxes
   2) Cost for land acquisition
   3) Cost for compensation for relocation of residents
   4) Cost for compensation for business
      * Costs regarded to be domestically transferred are ineligible.
      * Costs for investigation and disposal of unexploded bombs are regarded ineligible for loaning.

* Costs for environmental countermeasures, environmental monitoring are basically ineligible.

3. Loan Ratio:
   1) 85% of the total project cost is covered by the Loan.

4. Procurement Condition:
   1) The secondary sub-contract can be general untied contract.

2) Study cases

Financial study cases were set in combination of financial conditions, traffic demand and charge level.

a) Financial conditions

Alternative funding cases in this Study were made by combining the long term loan and subsidy or short term loan. It was assumed that the costs eligible for the long term loans are those comprising package 1, 2, and 3. Package 4 and 5 were excluded from the projects to be funded by the long term loan in this analysis.

Following financial case was basically adopted.

i) FC-O1	Financing the Project by long term loan (B) with limitation of 85% of the Project cost and subsidy (full cost recovery).

b) Traffic demand

The cases of the same and 60% of the forecast traffic demand in the F/S by JICA were taken account of.

c) Charge level

The charge level was also differentiated. Present charge level of the Can Tho ferry service was set as a base, and multipliers of 1.5 and 2.0 were applied.

3) Results

Through the financial analysis following issues are clarified.

a) Viability of the Project under favorable ODA loaning condition

This is a case of financing the Project by long term loan with a limitation of 85% of the Project cost and subsidy. The cash flow analysis proved that the Project is viable in this financial case with

the same charge level as the Can Tho ferry. The cash carry over will emerge from the first year of the opening. The Project will make a profit 6 years after the opening. DCF investment pay back period is 21 years.

In the same financing case with the charge level of 1.5 times higher than the Can Tho ferry, DCF investment pay back periods becomes 17 years.

However, in the evaluation of the results the following should be taken account of.

The future traffic demand on the Can Tho Bridge depends on the future regional economic activities and the population, the uncertain factors to forecast. Therefore, the possibility of large difference between the actual traffic demand and the forecast traffic demand is not small. It sometimes happened that the actual traffic demand was below the half level of the forecast one. In the case where the traffic demand is 60% of the forecast one in the F/S under the same financial condition FC-O1, DCF investment pay back period exceeds 30 years. In this case revenue from the toll charge can not cover the interest and repayment of the long term loan at initial stage. If short term loan is introduced to supply the deficit, short term loan will be continuously needed for more than 30 years because of the high interest rate. This case is not financially viable.

If the possibility of the change in circumstances caused by the force majeure or unforeseeable event is assumed, DCF investment payback period over 30 years is rather long. Effort to shorten the DCF payback period should be made. If short term loan is not applied, this additional resource must be taken care of by the Government. Such financial situation is not preferable.

b) Viability of the Project under the financing condition of long and short term loan without subsidy

This is the case of financing the Project by long term loan with a limitation of 85% of the Project cost and short term loan (FC-O1). The financial situation becomes more severe in this case. DCF investment pay back periods is over 30 years at the discount rate of 4%. Consecutive short term loan will be necessary to supply the deficit in the cash outflow of interests, repayments and operation and management. In the same financing case with the charge level

of 1.5 times higher than that of Can Tho ferry, the situation will be slightly improved.

In conclusion financing including the short term loan procured in the money market worsen the financial situation to the extent that the Project can not be realized (Figure 14.2, Table 14.5).

c) Possibility of covering operation and maintenance costs of the Bridge by revenue as an autonomous project

Operation and management costs after the completion of the Bridge are small. The total costs for operation and maintenance for 30 years is some 3.4% of the total project cost.

In the case financing the Project by long term loan with a limitation of 85% of the Project cost and subsidy with the same charging level as the Can Tho ferry, the revenue can well cover the maintenance and operation costs.

Sensitivity test to the cost increase (10% and 20%) and revenue decrease (-20%, -30% and -40%) was made for the case of the charge level 1.5 times higher than existing Can Tho Ferry charge level under FC-O1 condition. The result showed that the DCF investment pay back periods were considerably sensitive to the cost increase and revenue decrease. In the case of 40% revenue decrease, the DCF investment pay back period was extended to 23 years (Table 14.6).

In conclusion, although the expected revenue depends on continuous expansion of future traffic, the Project seems viable and can resist considerably to the falling of forecast revenue under favorable funding condition.

As an enterprise the profitability of the Project can not highly be expected without favorable financing conditions and government subsidies. It is necessary to select the long term loan with generous financing conditions of interest rate, grace period, repayment period, and applicable work items. It should be considered to introduce government subsidies for the Project. The subsidy for the Project cost should be considered to realize the average cost pricing principle, it means that the amount of the loaning portion put in use for financial analysis is reduced. Work items to be subsidized by the government shall be those to which no soft loan can be applied due to financing rules.

Table 14.5 DCF Payback Periods

Charge level	Traffic demand forecast	FC-O1
1) existing ferry charge level	1.1) same as the forecast traffic demand in the F/S	25 years
	1.2) 60% of the forecast traffic demand in the F/S	Over 30 years
2) 1.5 times higher than the existing ferry charge level	2.1) same as the forecast traffic demand in the F/S	20 years

Source: JICA Study Team

Note: A discount rate of 4 % was applied for the FC-S2 cases.

Table 14.6 Results of Sensitivity Analysis

FC-O1		Cost increase		Revenue decrease		
Charge Level - 1.5 times of Can Tho Ferry	Base case	10%	20%	-20%	-30%	-40%
Investment Payback Period (DCF)	17	18	20	20	21	23
ROI	6.2%	5.6%	5.1%	4.9%	4.2%	3.6%

Source: JICA Study Team

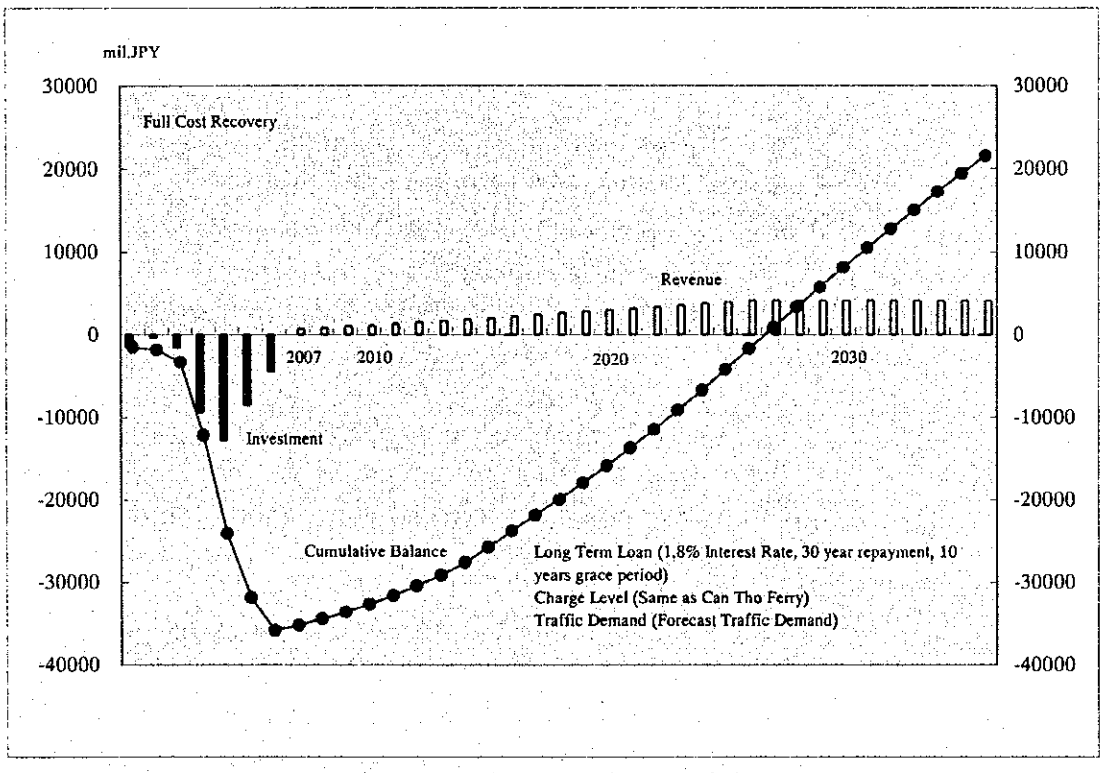


Figure 14.2 Cumulative Balance of the Project

14.2.5 Consideration on Financial Matters

In this section some important financial matters are discussed.

1) Principles for toll rate determination

Following two conditions should be basically satisfied in the determination of user charges for toll road or bridge.

a) Condition from the viewpoint of payback principle.

The charges should be determined so that total amount of revenue will recover the targeted project cost.

b) Condition from the viewpoint of user's benefit principle.

Toll charge should be determined within the user's benefit acquired from the said road/bridge compared to the case of using a existing road/bridge or ferry.

Those two conditions in the case of bridge are outlined and characterized below.

i) The determination of toll rate from the viewpoint of payback principle

If toll rates are determined equivalent to the marginal cost for the purpose of maximum utilization of bridge, the deficit for the payback is inevitable because theoretically the marginal cost is always below the average cost on condition of gradual cost decrease with respect to the traffic volume.

On the other hand if toll rates are determined equivalent to the average cost for the purpose of cost recovery, the decrease in social benefit is inevitable because the users who can expect a benefit between marginal cost and average cost are eliminated.

Therefore, it is said that the determination of toll rates below the level of full cost recovery, and supplemental subsidy for the deficit is preferable. However in this case it is inevitable that some inefficiency in the management will occur.

A bridge project can be characterized that the portion of the investment on fixed assets is considerably large, and marginal cost is small compared with total project cost because it mainly comprises direct costs for maintenance and administration. Therefore, marginal cost of bridge is almost negligible so far as traffic volume is within its capacity.

As a practical matter, determination of toll rate equivalent to the marginal cost is difficult somewhat due to the financial resources for the subsidy and somewhat due to difficulty in the identification of marginal cost.

In a practical way the toll rates determined by the average cost principle were adopted for toll roads and bridges in the world.

In the case that the computed charge level is too high for the affordable level of users, and traffic demand does not meet the required level for project viability, some countermeasures will be necessary. Government subsidy is regarded as such most common countermeasure to lower the average fixed investment cost to be repaid.

ii) The determination of toll rate from the viewpoint of user's benefit principle

This method is to determine the toll rates based on the amount of the user's benefit from the use road/bridge.

The benefits usually taken account of to determine toll rates for the use of the road/bridge are the direct benefits such as time related, distance related and comfort related.

In the case of the bridge, toll rates higher than existing ferry charge for the use of the bridge seem acceptable because of the perceptive travelling time reduction by the bridge instead of the ferry.

Generally it is commonly said that acceptable level of toll rates are some 70% of the benefits.

In the case of the bridge it means that the toll rates should be set at the level of some 70% of direct benefits in addition to the existing ferry charge.

The benefits related to vehicle operation cost (VOC) including those time related and distance related in 2007 was estimated at 102,170[1] million. VND per year according to the "Feasibility Study on the Can Tho Bridge Construction in Vietnam" in 1998 by JICA. The 70% level of the benefits becomes 71,520 million. VND.

[1] Prices are shown at 1997 current prices.

Provided that existing ferry charges are applied to the Can Tho Bridge, the revenue in 2007 was estimated at 84,218 millionlion VND. If 71,520 million VND is added to this amount, it becomes 155,740 million VND, 1.85 times larger than the one obtained from exiting ferry charges. Existing ferry charges at Hau Gian River include 6.6% to 20% of tax to the provincial committees. If such tax portion is excluded from ferry charges, the total amount of the revenue by the bridge in this case will be some 2.0 times larger than the one by the existing ferry.

Considering above circumstances, the weighted average toll rates for the Can Tho Bridge should be determined at somewhere between 1 and 2 times larger than the existing ferry charges.

In Japan toll charges are usually determined after the project cost recovery analysis. In Viet Nam also an average cost principle should be the base for the determination of toll rates because of the insufficient financial resources in the transport sector. In addition the modification should be made from the viewpoint of user's benefit principle. The financial analysis proved that the user's benefit principle is applicable for the determination of toll rates for the Can Tho Bridge.

2) Determination of toll rates by vehicle type

The direct benefits of each vehicle type by the Can Tho Bridge were estimated as follows in the "Feasibility Study on the Can Tho Bridge Construction in Vietnam" in 1998 by JICA (Table 14.7).

Table 14.7 Benefits by Vehicle Type (2007)

(unit:VND)

	MC	PC	LB	HB	LT	MT	HT
Benefit	2,521	10,555	23,915	86,875	2,001	7,059	8,831
Time related	3,785	17,051	30,022	102,881	5,879	13,270	16,255
Distance related	-1,264	-6,496	-6,106	-16,006	-3,878	-6,211	-7,424
Ratio (PC=1)	0.24	1.00	2.27	8.23	0.19	0.67	0.84

Source: JICA Study Team

Note: Passenger time cost of passenger car was revised in this Study.
25 minutes were assumed as a reduction of time for river crossing by using the Bridge.
2km was assumed as an expansion of travelling distance by using the Can Tho Bridge.
Costs are those in 1997.

Relatively small time related benefits for trucks were estimated. This is attributable to the assumption of low occupancy rates of trucks and low time related cost of cargo. On the contrary, heavy vehicles such as trailers and heavy trucks are regarded as the main cause of the road damage. Accordingly the heavy toll rates for heavy vehicles are justifiable from the viewpoint of road maintenance. As a practical solution the toll rates by vehicle type should be set based on the user's benefit principle with some consideration on the vehicle weight (ex. number of standard axles).
Presently it seems that the toll charges for Can Tho ferry are determined based on vehicle weight rather than user's benefit from the viewpoint of transport capacity of the ferry (Table 14.8).

Estimates of user's benefit revealed that relatively high toll charges to trucks and relatively low toll charges to passenger cars and buses would be applied if the same toll rates as the Can Tho ferry are adopted.

Since drastic change in toll rates by vehicle type may have a large influence on the users, gradual shift of toll rates from vehicle weight basis to user's benefit basis is desirable from the beneficiary pay principle.

In Japan roughly the toll rate ratios of 1.5, 2.5, and 7.5 are applied to heavy trucks, trailers, and large buses compared to passenger car respectively for toll road.

Table 14.8 Fares of Hau Giang Ferry at Can Tho, 2000

(Unit: dong)

	Mode of Travel	Fare	Constituent	
			Ferry company	River administration
1	Pedetrian	600	500	100
2	Bicycle	1,000	800	200
3	Motorcycle	2,000	1,650	350
4	Bicycle(Motorcycle) with trailer, cyclo	4,000	3,300	700
5	Sedan, Microbus	11,000	10,000	1,000
6	Minibus (under 14 seats)	15,000	14,000	1,000
7	Minibus (15-29 seats)	21,000	18,000	3,000
8	Minibus (30-49 seats)	26,000	22,500	3,500
9	Minibus (50 seats up)	30,000	26,500	3,500
10	Truck (under 3 ton loading capacity)	18,000	16,300	1,700
11	Truck (3-5 ton loading capacity)	23,000	21,000	2,000
12	Truck (5-10 ton loading capacity)	33,000	29,200	3,800
13	Truck (10-15 ton loading capacity)	40,000	36,000	4,000
14	Truck (15-18 ton loading capacity)	550,000	51,000	4,000
15	Special vehicle	80,000	75,000	5,000
16	Contract vehicle	250,000	250,000	

Note: Fares are not revised for 3 years.

Source: Hau Giang Ferry Company, The Road Management Union No. 7

3) Revision of toll rates

The maintenance and operation costs vary proportionally corresponding to the change in prices, however, the already invested construction costs and its interest are constant. Therefore, revision of toll rates exactly in proportion to the change in prices is not necessary to recover the project cost. Only the portion of toll rates corresponding to the costs such as maintenance and operation needs to be revised to reflect the change in prices for the payback without any negligence.

However, in case the actual transport demand become smaller than the forecast one, the total toll rates should be revised.

Usually the revision of toll rates is not performed simultaneously with the change in prices. Time lag behind the change in prices is often the case of revision of toll rates. A sudden and drastic revision of toll rates is hardly acceptable by users.

From the user's pay principle corresponding to the rise of future users' benefits by the bridge, revision of charge level is well persuasive.

Considering above the upper limitation of the toll rate revision should be the same as the rise in prices. It means that the toll rates multiplied

by the increase rate of price index become the maximum revised toll rates.

In this maximum revision case, since the revised toll rates only keep the real value of toll rates, the elasticity of the transport demand with respect to the toll charge is supposed to be almost zero. Therefore the change in the transport demand is also expected to be negligible. The revision of toll rates will alleviate the burden of the payback for the investment on infrastructure, because the repayment amount is not changed.

4) Risk control and VFM improvement

Assumable measures to improve the financial condition are following.

- To encourage the entree of private sector to restrict the expenditure by the public sector and utilize the private sector's flexibility and efficiency for the implementation of the project.

- To adopt rational risk allocation to control the total risk cost to improve the value for money of the public sector as a private finance initiative.

The latter is a world trend in recent years in the field of public works.

The risk types and countermeasures by public sector from the financial aspects are summarized below (Table 14.9).

Operation is a sector where managerial problem in efficiency can be sometimes found. In the case of bridge it seems more efficient to devise and implement the mechanism for the maintenance and operation to utilize the managerial flexibility and efficiency in the private sector. For this purpose standards and manuals for the operation and management shall be developed to keep the high quality of service. Under this circumstances an alternative way to entrust maintenance and operation works to the private sector shall be promoted.

The market risk is generally considered to be large in the case the users of the project (the payers for the cash flow) are individuals. Transport infrastructure projects are regarded to be in the sectors where large market risks exist, because the transport demand is difficult to forecast unless traffic congestion is obviously observed. The possibility of a financial problem due to the unexpected small transport demand can not be denied in the Can Tho Bridge project. In such case some countermeasures should be considered for the improvement of

financial condition. The unification of toll charge system of unprofitable toll bridge with profitable toll bridge, and the establishment of unified financial adjustment mechanism to allocate the surplus of the revenue from profitable toll bridge to the management of unprofitable toll bridge are regarded as such a useful countermeasure.

Table 14.9 Risk Types

	Risk type	Contents	Countermeasures by the public sector from the financial aspect
a)	Construction risk	Delay of construction work	Legal procedure for the mobilization of the equipment, construction machines and materials shall be improved.
		Cost overrun	Tender document shall be improved.
		Insufficient performance	Technical standard for the construction work and material performance shall be checked and developed.
b)	Relevant work risk	Land expropriation problem	The system to provide officially assured substitutive land through exchange, integration and separation shall be developed.
		Inappropriate timing of connected/relevant infrastructure construction work	Timely construction of connected/relevant infrastructure is essential to get benefit from the Project. Therefore planning schedule of infrastructure shall be adjusted and the budget shall concentrate on the construction of connected/relevant infrastructure.
c)	Operation, management risk	Increase in operational /management cost	Standards and manual for operation and management shall be developed to keep the high quality of service. Under this circumstances the alternative way to entrust maintenance and operation work to the private sector for efficiency is recommended
d)	Market risk	Insufficient demand	Relevant development (ex. Industrial area, port facilities) to generate demand shall be promoted. The way to reallocation of the revenue from the profitable project to the unprofitable project shall be devised.
		Uncertain governmental approval for toll charge	The rational and flexible procedure for toll rate revision corresponding to the change in transport demand and prices shall be established.
e)	Macro risk	Change in prices (inflation, deflation)	This is the matter of macro economic policy by the Government rather than the organizations directly involved in the Project.
		Rise of interest rate, change in exchange rate	This is the matter of macro economic policy by the Government rather than the organizations directly involved in the Project.
f)	Social risk	Inhabitants' opposition, environmental problem, lawsuit	EIA at sufficient level shall be implemented to avoid unnecessary environmental problems. Also environmental monitoring system shall be developed.

	Risk type	Contents	Countermeasures by the public sector from the financial aspect
g)	Technology risk	Mismatch between need and supposed technical service which has become outdated	After the completion of the project F/S shall be implemented to identify the rationale of the service renovation of the project.
		Relative cost increase for the introduction of advanced technology	F/S shall be well performed to cope with the advance of technology.
h)	Institutional risk	Change in policy	Large scale projects shall be included in regional/ national development master plan.
		Alteration of official approval procedure/standard	Influence on the financial condition shall be well examined.
		Change in taxation	Influence on the demand, revenue and repayment schedule shall be well examined.
i)	Force majeure	Disaster (war, riot, earthquake)	For the earthquake sufficient seismic design standard and advanced seismic design method shall apply. (Any loan condition does not cover force majeure and insurance contract usually excludes damage by force majeure. Therefore the primary risk are taken by the debtor.)

14.3 Economic Internal Rate of Return (EIRR)

Economic Internal Rate of Return (EIRR) was studied in the Feasibility Study Stage undertaken by JICA from August 1997 to September 1998.

In the Feasibility Study Stage, the detailed calculation including the sensitivity analysis was examined, and the conditions of the analysis and the results were as shown in the following:

(1) Conditions and Methods of Economic Analysis in the Feasibility Study Stage

- First Year of the Occurrence of Economic Benefit: 2006
- Estimated Economic Benefit

Direct Benefits:
- Savings in waiting time related to freight and passenger traffic with a new bridge
- Saving in ferry operating costs and additional ferry improvement costs for the without bridge case

Indirect Benefits: Increase in land price of the right bank of the Hau River (Can Tho city side)

- Estimated Economic Cost

  Economic cost of the project was mainly composed of "construction cost' and "maintenance cost". With considering the circumstances for economic cost estimate (Shadow Price, etc.), economic construction costs were estimated by applying the conversion factors to the direct cost in total project cost. Consequently, the economic cost is lesser than the actual project cost. The portions of estimated economic cost are as follows:

  - Construction Cost
  - Engineering & Administration Cost
  - Land Acquisition and Compensation
  - Physical Contingency
  - Maintenance Cost

(2) Results of Economic Analysis in the Feasibility Study Stage

- Results of EIRR (Base Case) 13.47%

- Change of EIRRs in Sensitivity Analysis

		Benefit			
		Base Case	- 10 %	- 20 %	- 30 %
Cost	Base Case	13.5 %	12.7 %	11.9 %	10.9 %
	+ 10%	12.8 %	12.0 %	11.2 %	10.3 %
	+ 20 %	12.2 %	11.4 %	10.6 %	9.8 %

In this stage, the base case was reviewed. The adopted method of analysis was basically same with Feasibility Study Stage, but the following conditions are different:

- First Year of the Occurrence of Economic Benefit: 2007

- Amount of Economic Construction Cost

The benefit occurring in each year was mainly defined based on the future traffic forecast, and the benefit data of Feasibility Study was applied for Detailed Design with one year shifting of the first year (from 2006 to 2007).

With reference to the increase of direct construction cost, the economic construction cost was also increased. The percentage of increase was about 16% of the total amount of Feasibility Study.

The reviewed value of EIRR of Detailed Design Stage was 12.49%. This figure has the good consistency with the results of sensitivity analysis in the

Feasibility Study Stage, and consequently, the conclusion of the economic analysis was not changed from the previous stage.

Chapter 15

CONCLUSIONS AND RECOMMENDATIONS

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(1) The geomorphology of this region is a vast alluvial marsh and plain. Around two major rivers, the Tien River and the Hau River (divided from the Mekong), numerous tributaries, lakes and/or marshes join, to form a great water network. On the river sides, low and flat land spread extensively.

(2) River sand is found available for road embankment around the Project site. The locations are Hau Giang, Doi Ngai, Tra Ech, Long Xuyen, and Tan Chau.

(3) Rocks and sands are widely used for road construction in Viet Nam. The following locations are used for subbase and base course, namely, Bien Hoa, Vung Tau, Coto, Dong Nai, Long Xuyen and Tan Chau.

(4) The cements available in Viet Nam are Chin Fong, Morning Star, and Nghi Son. Coto granite is fairly good quality for concrete aggregate of which alkali reaction factor is judged to be harmless. Than Chau river sand is good as a fine aggregate for concrete.

(5) For the flood analysis at the Can Tho Bridge site, the Log-normal Distribution Iwai's Method was adopted after comparison with other methods. The high water levels (flood water level) were 177.59 cm for 20-year reoccurrence (5%) and 184.97 cm for 100 years reoccurrence (1%).

(6) The local scouring depths around the tower (South Tower) were 24.48 m in case of pile foundation in consideration that the riverbed around the tower might be degraded 11.50 m from the present riverbed.

(7) Standards and Specifications for the design of the Can Tho Bridge were based mainly on the Vietnamese standards, otherwise AASHTO specifications and Japanese Standards were used from the reasons of reliability and proof check of safety.

(8) Due to the locations of temples and cemeteries, the project centerline was shifted 220 m downward from that of the Feasibility Study.

(9) It was concluded that the typical transverse cross sections consist of four-lane carriageways and two non-motorized lanes as trafficable function, which was able to allow approx. 60,000 pcu/day.

(10) On the project route, three interchanges and one intersection were concluded. Those were the connections to NH No. 1, NH No. 54, and NH No. 91B. The types of interchange were selected mainly from the

reasons for minimizing the land acquisition and geometrical conditions.

(11) The central span length of 550m for the main bridge was recommended by the Study Team and concluded by the Vietnamese side to clear the navigable width of 300m, to construct the North Pier on the land without hydrodynamic issues, and to construct the South Pier to avoid the high velocity area of the river flow for minimizing local scouring of the riverbed.

(12) The location and the foundation depth of the tower (North Pier) on the left riverbank were decided from the following reasons: to maintain the maneuvering safety for large size vessels and to avoid hydrodynamic problems by locating the tower pier on the land, which is also able to economize construction costs compared with constructing the tower pier in the river.

(13) The possible types of the main bridge to span the length of 550 m are Hybrid Cable-stayed, Steel Cable-stayed and Steel Suspension Bridge. Among these bridge types, Hybrid Cable-stayed type is recommended for mainly economical reasons.

(14) Vertical and torsional responses versus wind speed were tested with the three cases of attack angle (0, +3, -3 degree) and 0.03 of the damping coefficient, in the wind tunnel. Flutter vibrations were not occurred until the wind velocity reached to 100 m/sec, 320 m/sec, and 281 m/sec in the cases of attach angle of 0, +3, -3 degree respectively.

(15) Vortex-induced vibration may occur on the stay cables during rain (rain-induced-wind-vibration). Countermeasure such as damping devices to reduce quite large vibration should be considered.

(16) Opening by the designed bridges and box culverts were examined to avoid the disturbance of the water flow by road embankment. The designed discharge by opening was greater than the required one by 2%. The designed opening by bridges and box culverts was greater than the required one by 51%.

(17) The detailed design of infrastructures and facilities was carried out based mainly on the discussions with People's Committee of Can Tho Province and People's Committee of Vinh Long province, and other related authorities and organizations.

The total areas for Bin Minh Resettlement Area (R.A), Hung Phu R.A and Chau Thanh R.A. are 60,645 m^2, 10,815 m^2 and 21,250 m^2

respectively.

(18) Project Outline

a) Project Length : 15,850 m

b) Bridge Features

- Total Bridge Length : 2,750 m
- Main Bridge : 1,090 m
- Vinh Long side approach span bridge : 480 m
- Can Tho side approach span bridge (Including 180 m of the sub stream bridge) : 1,180 m
- Bridge Width (4-lane carriageway) : 23.1 m

c) Approach Roads

i) Road Length
- Total Length : 13,100 m
- Vinh Long Side : 5,410 m
- Can Tho Side : 7,690 m

ii) Service Area
- Vinh Long Side : 21,000 m^2
- Can Tho Side : 21,000 m^2

iii) Toll Gate and Management Office : 1 location

(19) The organizations related to budget procedures and allocations for the Can Tho Bridge will be Viet Nam Roads Administration (VRA), Regional Management Unit (RRMU VII), and Inspection and Maintenance Company for Can Tho Bridge will be involved for maintenance actions.

(20) Total estimated environmental cost is US$10,324,773, including US$10,114,773 for land acquisition and mitigation measures for adverse impacts on socio-economic environment, and US$210,000 for environmental monitoring programs.

(21) The Project Cost was estimated including the following items.

- Construction Cost
- Resettlement Area Cost
- Engineering and Administration Cost
- Land Acquisition and Compensation Cost

- Environmental Monitoring
- Physical Contingency
- Price Escalation
- Duty Tax
- UXO Cost
- Interest during Construction
- O&M Cost

(22) The appropriate size of contract of the Project was recommended for the implementation under the JBIC Guideline. It is recommended that the main route should be three packages, namely, Package-I covering the Approach Road of Vinh Long side, Package-II covering Main Bridge across the Hau River, and Package-III covering the Approach Road of Can Tho side, as international tenders, with considering the following matters.

- Concentration of the management for the whole project at one head office
- Minimizing the number of construction yards and offices
- Minimizing the organization and staff to be required
- Unified control for the construction quality and progress
- Maintaining the effective communication system

(23) The implementation of the Project will be scheduled tentatively as below:

- The Detailed Design will be accomplished by October 2000
- Land acquisition including resettlement for people to be removed should be started from April 2000.
- Selection of Consultant will be from January 2001 to June 2001
- Pre-qualification will be from July 2001 to September 2001
- Tendering is from October 2001 to June 2002
- Commencement of Construction will be June 2002

(24) The financial analysis proved that the Project is feasible under the long term loan and governmental subsidy. It was assumed that the long term loan covers 85% of the project costs of packages 1,2, and 3 with an interest rate of 1.8% per annum and 30 year repayment period including 10 year grace period. The subsidy was assumed to apply to the costs of package 4 and 5 and the remnant costs of packages 1,2, and 3. The calculated pay back periods are as following.

- 20 years (1.5 times higher charge level than Can Tho Ferry)
- 23 years (60% of the forecast traffic volume, 1.5 times higher

charge level than Can Tho Ferry)

(25) At the end of the Detailed Design Stage (September and October 2000), a flood occurred at the Mekong Delta, and large areas including the Project site were affected. The review of this flood data at the beginning of the next stage is strongly suggested. Moreover, if necessary, the design works will be amended after considering this flood data before the pre-construction procedures.

(26) After the construction is completed, one large pylon is established permanently near the navigational route. Securing of the navigation is necessary to be considered and noticed, not only during construction, but also in the operation stage.

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