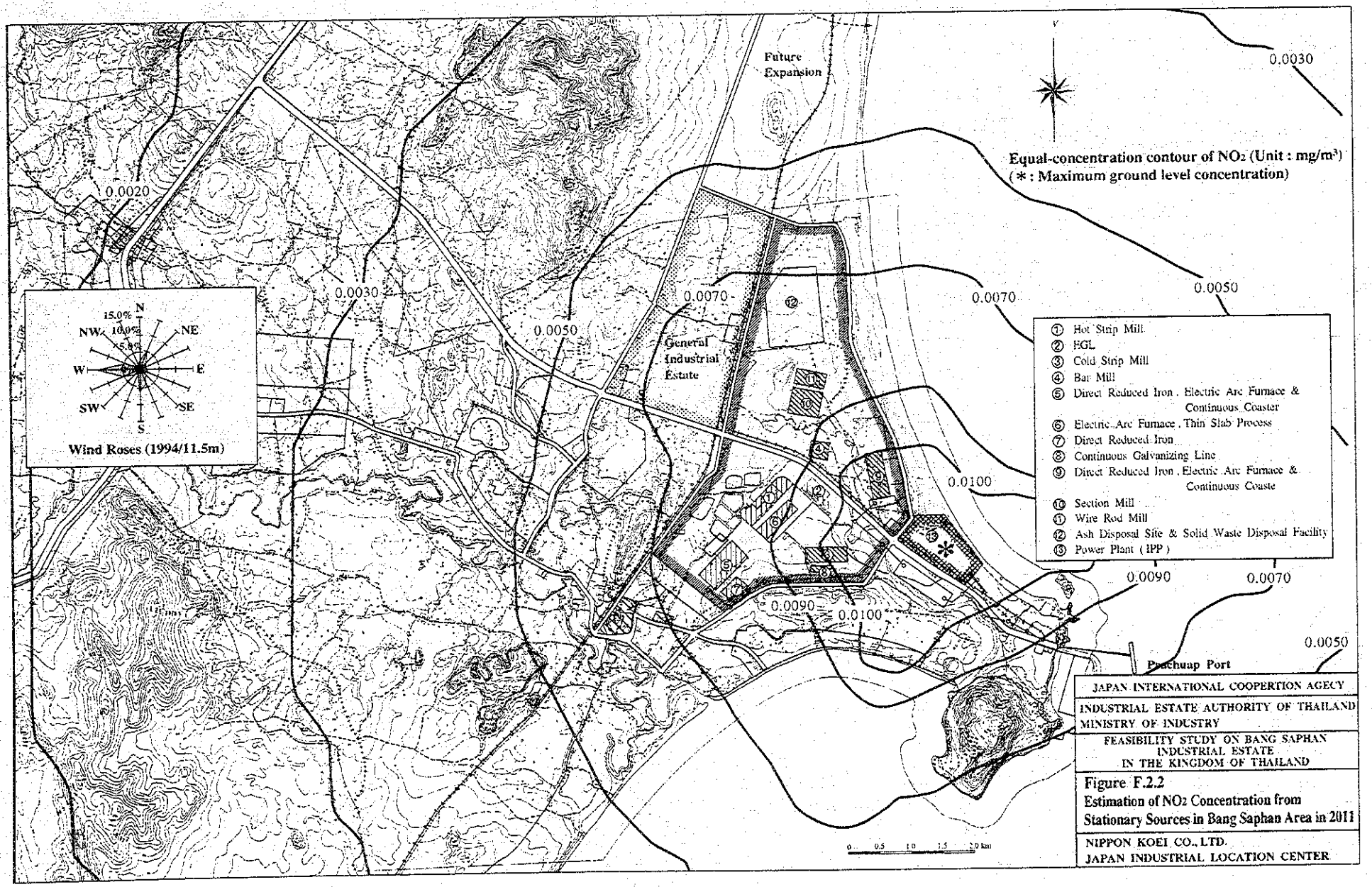

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MINISTRY OF INDUSTRY

FEASIBILITY STUDY ON BANG SAPHAN INDUSTRIAL ESTATE IN THE KINGDOM OF THAILAND

Figure F.2.2
Estimation of NO_2 Concentration from Stationary Sources in Bang Saphan Area in 2011

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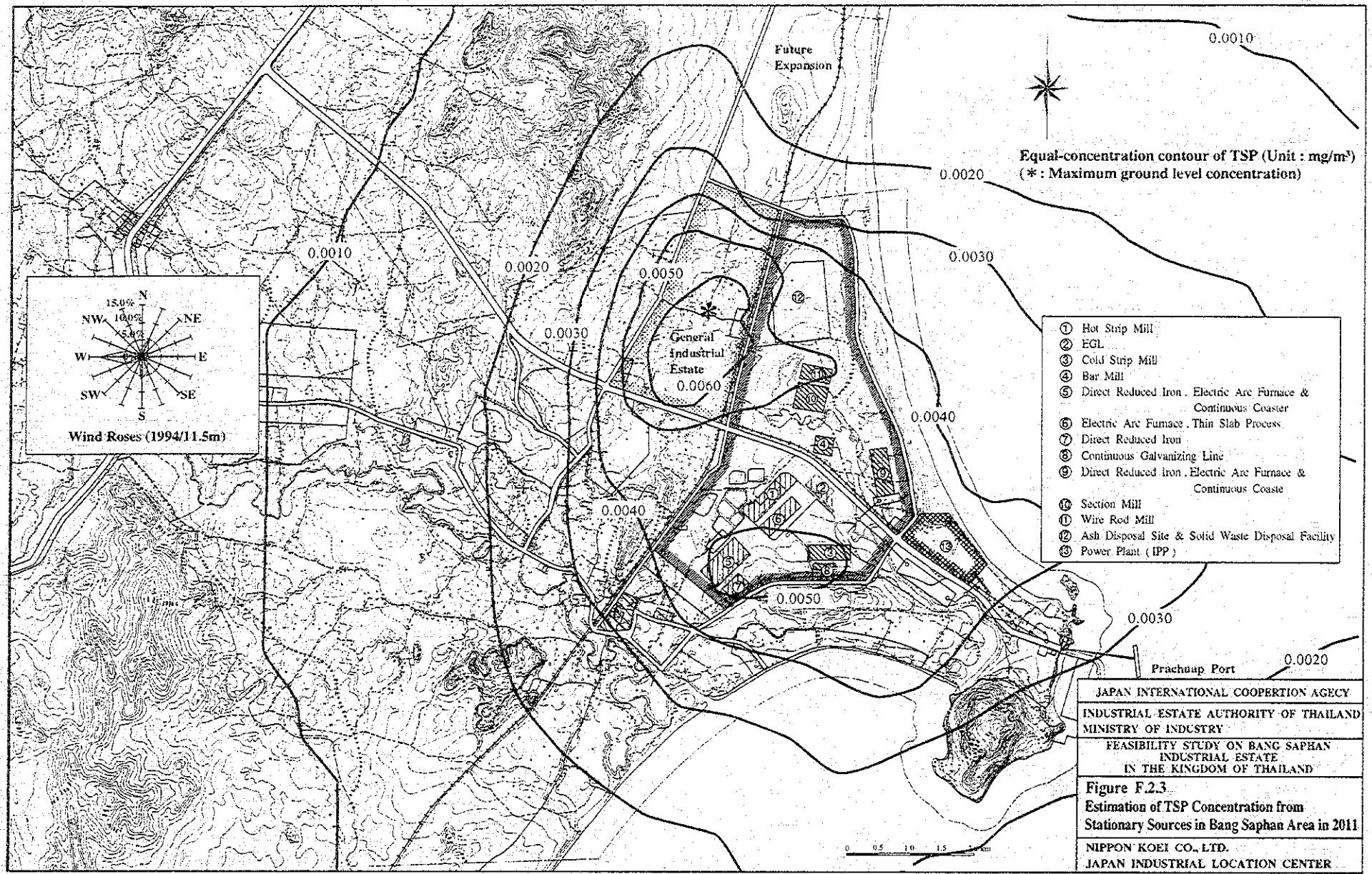

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FEASIBILITY STUDY ON BANG SAPHAN INDUSTRIAL ESTATE IN THE KINGDOM OF THAILAND

Figure F.2.3
Estimation of TSP Concentration from Stationary Sources in Bang Saphan Area in 2011

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APPENDIX G IMPLEMENTATION METHOD AND PROJECT EVALUATION

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APPENDIX G IMPLEMENTATION METHOD AND PROJECT EVALUATION

G.1 Implementation Method

G.1.1 Integrated Development Organization for Industrial Estate Area

The Board of Development & Management of the Bang Saphan Free Trade Area (FTA) is recommended to be established to administer economic development in the designated Bang Saphan area. The Board will be managed in accordance with the policy set out by the Committee of Western Sea Board (WSB) Development under NESDB.

The Board is advised to consist of representatives not only from governmental authorities such as BOI, IEAT, Customs Department, etc., but also from private sectors such as industrial developers, financial institutions, manufacturing firms, etc. Under the Board, an executing organization, so-called " Bang Saphan FTA Corporation " (the Corporation) should be set up to administer and manage the activities undertaken by several companies in cooperation with and with assistance of the Customs Office.

The Integrated Development Organization is schematically presented in Figure G.1.1.

D.1.2 Industrial Estate

A "Joint Venture" Company ("JV") is proposed to be established between a private company and IEAT in order to implement the development of the Bang Saphan Industrial Estate. The equity proportion and the form of equity contribution of each party will be determined between the parties concerned. But it should be noted that the private company will play the main role in the project in terms of not only financing but also operation and management. Here, the total equity amount is assumed to be 30% of the project cost for Phase 1 the remaining 70% will be raised by the private company from the financial market of Thailand or of foreign countries. The project cost for the subsequent Phases 2 and 3 will be principally raised from the financial market and in part from internal fund gained through lot sales operation. The project formation is schematically presented in Figure G.1.2.

The development of the industrial estate by establishing a JV in which IEAT takes an equity participation, but a minor participation, will be the first case for IEAT. In terms of equity-participation in a company, the conventional "Joint Venture" defined in the IEAT regulations had better be called "Joint Operation". However, both could be still classified as Category 2 - Joint Venture between IEAT and a private developer among the following three categories :

1. IEAT (Industrial Estate Authority of Thailand)-owned and managed estates,
2. Joint Venture between IEAT and a private developer,
3. Developments wholly managed and owned by private developers.

Categories 1 and 2 are eligible for IEAT incentives and Board of Investment (BOI) promotional privileges. Most of these developments have an approved status and carry the title "Industrial Estate" after their name. Category 3 does not qualify for IEAT incentives or automatic BOI privileges and enterprises under this Category are not allowed to carry the title "Industrial Estate". Category 1 is rather difficult due to the privatization principles of Thai Government, therefore Category 2 is the most possible formation. In the Category 2, "Joint Operation" is not much attractive for the private sector according to the interview of private developers of industrial estates. Accordingly, Joint Venture between IEAT and a private developer is recommendable for the development of the industrial estate.

In the light of the IEAT regulations, the responsibilities of each party are advised to be defined as follows :

Responsibilities of IEAT:

1. To supervise, direct and advise on the design and construction of public facilities and utilities within the industrial estate;
2. To recognise it as an industrial estate;
3. To help the JV administer and operate in accordance with IEAT Act.

Responsibilities of the Private Developer:

1. To find suitable land and location;
2. To develop public facilities and utilities within the industrial estate;
3. To sell the land in the project area;
4. To operate and maintain various facilities and utilities of the industrial estate with support and in cooperation with IEAT

The project of "Bang Saphan Industrial Estate" being located in Zone 3, is expected to enjoy the following tax privileges as Board of Investment' incentives in accordance with BOI Announcement No.1/1991, dated March 20,1992 ;

Benefits for Zone 3

1. Corporate Income Tax exemption for 8 years and 50% deduction for 5 years after this grace period;
2. Import duty exemption (100%) on machinery;
3. Import duty exemption (100%) on raw materials used for exported goods for 5 years for export of at least 30% of total sales;
4. 75% import duty deduction for raw materials for 5 years for products manufactured for domestic use;
5. Double deduction from taxable income of water, electricity , and transportation costs for 10 years;
6. Exemption of export duty;
7. 25% deduction on the costs of installing infrastructure facilities from net profit

In connection with the industrial estate development, among the above, items 1 and 2 can be enjoyed by the JV. However, 7% VAT will be principally imposed on any transactions.

In light of the global liberalization on trade and investment, especially in the South East Asian countries represented by APEC, AFTA, etc., intensified competition has put manufacturing companies under great pressure, and they are responding by investing only in the most favorable places. Countries should take this as a challenge rather than a threat if they want to win the battle for Foreign Direct Investment (FDI).

Under such an environment in the industry sector, the main objective of the industrial estate development should be to attract domestic/foreign investors. To attain this objective under the present situation that several steel industries have been already located in the area and the industrial estate development has been determined to be initiated by the private sector, public support to make the industrial estate more efficient and more attractive will be indispensable, not only from the institutional viewpoints, but also from the financial and managerial viewpoints.

Such positive involvement of the public sector in this project will be really in line with the envisaged strategy of IEAT towards the coming 21st century that IEAT no longer acts simply as regulator of industrial estate development in which IEAT plays a role in the promotion and partial operation of it; its functions might include those of organizer, coordinator, assistant, and partner. To succeed, IEAT will need to change its orientation and acquire new skills. In this sense, the Bang Saphan I/E will be a challenging project for IEAT. Furthermore, this is a good opportunity to keep a leading edge in the industrial development in Thailand.

G.1.3 Water Supply Facilities

In the initial stage of the Bang Saphan Industrial estate development, PWA is advised to play an important and responsible role in supplying water to the project site in the same way as in the Eastern Seaboard development. Therefore, its role will have to be limited at the initial stage to only distribution of raw water to the "Bang Saphan Area", which is to be collected from the Bang Saphan river basin. After the project is recognized to progress satisfactorily and water from the Tha Sae Dam is available in 2004 - 2005, the management structure is recommended to be shifted from the public-sector initiative to the private-sector initiative to meet the increasing demand with progress of regional development in the Western Seaboard Area. Finally the "West Water" (provisionally named) is recommendable to be established as shown in Figure G.1.3. for supplying water to the Western Seaboard Area. The role which the "West Water " will play in the Western Seaboard Area is principally the same as the " East Water " in the Eastern Seaboard Area.

In order that the "West Water" is allowed to exclusively use and distribute raw water to the Western Seaboard Area, which is to be pumped up from the Tha Sae Dam reservoir, it will be indispensable that the government agencies concerned such as IEAT, PWA, MOF and Ministry of Industry be involved in this scheme in the form of equity participation or in other form, in the operation of the West Water.

The equity participation of the government agencies in the West Water will contribute to a proper / efficient development and management of water resources from the viewpoints of social and economic development in the Western Seaboard Area in line with the national development policy.

The positive attitude of the Thai Government toward the development in the Western Seaboard will help not only domestic investors but also overseas investors, locate or relocate their manufacturing bases to the Area, where full promotional privileges could be enjoyed. This kind of move corresponds to the Government's policy of distributing investment across the country and creating employment in the region.

G.1.4 Power Supply Facilities

PEA is expected to be fully responsible for installing a distribution line from the nearest PEA's substation (Bang Saphan Substation) to a substation in the Industrial Estate. The distribution line and other facilities in the Industrial Estate have to be constructed by the JV.

G.1.5 Telecommunication Facilities

TOT is expected to be fully responsible for installing a distribution cable up to the exchange station in the Industrial Estate. The exchange station and the distribution line in the Industrial Estate have to be constructed by the JV.

G.1.6 Sea Port Facilities

The role of the sea port facilities is strategically important for the development of the Bang Saphan Industrial Estate in due consideration of its location and its characteristics such as deep water, easy access, etc. Prachuap Port is now operated and managed by Prachuap Port Co., Ltd., which is not yet listed on the Stock Exchange of Thailand (SET).

In light of the future development envisaged in the area, the expansion of the existing port facilitiies will be inevitable. In this connection, the fund for the port expansion will be required and at the same time the social responsibility of the port company as an infrastructure utility, will be eventually increased. To meet these requirements, it will be one of solutions for the company to be listed on the stock market.

The financial scheme for expansion of port facilities is schematically presented in Figure G.1.4.

G.2 Evaluation for Development of Bang Saphan Industrial Estate

G.2.1 General

The project evaluation has been carried in two steps in which the first step deals with the economic viability and the second deals with the financial viability. The economic viability of an infrastructure project is aimed at determining whether the project is consistent with the regional objective of industrialization of the Bang Saphan Area. The economic viability is measured in terms of the economic internal rate of return (EIRR).

On the other hand, the financial viability of a project is aimed at determining how the project can be implemented from the viewpoint of an infrastructure developer.

The financial viability of a project can be determined from either or both of the following viewpoints:

a. "all capital" approach which looks at the discounted returns to all real investment flows for the project as a whole, irrespective of whether these come from equity or loans. This is expressed in terms of "Return on Investment" (ROI).

b. "equity capital" approach which looks at the proponent's equity contributions as the investment in such a way that loan proceeds are treated as inflows while loan repayments are treated as outflows. This is expressed in terms of "Return on Equity" (ROE).

In this study, the financial viability of the project is evaluated principally by the "equity capital" approach because the decision makers have to decide whether debt financing could be secured for the project in due consideration of availability of debt finance and cost of its fund.

The inflows and outflows to be used for the respective analysis are shown in Table G.2.1.

G.2.2 Economic Viability

(1) Method of Economic Analysis

The economic analysis of the industrial estate development is to be made in terms of EIRR, where the industrial output (production) to be generated by the potential industries located in the Industrial Estate is regarded as main benefits of the Project. The EIRR is determined as a discount rate that equalizes the present value of the

streams of costs and benefits over the project life (30 years), where the effect of the industrial estate development is evaluated in terms of value-added generated by the potential industries in the Industrial Estate.

The industrial production will be estimated based on several indicators such as "productivity per employee", "number of employees required to run a lot factory", "capital investment", etc. in accordance with the industrial development scheme.

(2) Pre-conditions and Assumptions

The pre-conditions and assumptions in relation to the industrial production are summarized below.

Value-added to be Generated by Potential Industries

	2001	2006	2011
Number of employees	2,415	6,050	11,920
Value-added per employee (1,000 baht)	2,342	3,090	2,874
Value-added (million baht)	5,657	18,697	34,256

The industrial productivity is represented by "value-added per employee", where a value-added is defined as turnover (sales) minus material cost, that means, representing labour cost, depreciation, interest, profit before tax, etc. As shown above, the industrial production is estimated at 34,256 million baht/year in 2011 in terms of "value-added" where the "value-added per employee" is 2,874,000 baht/employee.

On the other hand, the capital investment by potential industries to be required to induce such industrial production is estimated mainly based on the data - Factories in Industrial Estates 1995/96 published by IEAT.

The value of "capital investment per employee" is here adopted for the capital-intensive industries represented by petrochemical and steel manufacturing.

The capital investment per employee for the representative petrochemical and steel industries is distributed in a wide range as shown in Tables G.2.2 and G.2.3.

For EIRR calculation, the median of the data is adopted for the base case and the quartile (75%) is adopted for the sensitivity analysis as shown below.

Capital Investment Per Employee

Median	1,600,000 baht/employee
Quartile	4,000,000 baht/employee

(3) Economic Analysis

The project is to be economically evaluated in terms of the economic internal rate of return (EIRR) on a cashflow basis under the following pre-conditions:

Input

(+) Construction cost for Bang Saphan I/E (in 1996 price)	2,768 million baht
(+) Cost for external infrastructure[1]	11,574 million baht
(+) Capital investment by potential industries in I/E	28,608 million baht
(+) Working capital (30% of capital investment)	8,582 million baht

Output

(+) Industrial value-added from I/E factory lots	2,874 thousand baht per employee per year
(+) Value-added from utilities	12% of the acquired cost per year

(4) Results of Economic Analysis

For the base case, the cost for the external infrastructure is totally charged to the capital cost of the industrial estate development. EIRR has been calculated at 51% as shown in Table G.2.4. This may be too much conservative. Therefore, the cost of the external infrastructure attributable to the Industrial Estate development is estimated at 3,270 million baht, corresponding roughly to 30% of its total cost of 11,575 million baht, increasing the EIRR value to 68% as shown in Table G.2.5. A summary of economic analysis is given in Table G.2.6.

---

1 Cost for External Infrastructure

The cost for development of the external infrastructure is estimated as below;

1.	Port facility		6,095	million baht
2.	Water supply facility		3,258	million baht
3.	Road	Access road, Interchange	1,168	million baht
4.	Power facility	Transmission line	287	million baht
5.	Telecommunications		17	million baht
6.	Hazardous waste treatment		750	million baht
			11,575	million baht

From the economic viewpoint, it could be said that the project is significantly viable and will have a significant impact on the industrial development in the Bang Saphan area under such a condition that the environment for flows of foreign direct investment into this region be properly arranged under the Government initiative through aggressive capital formation for the economic/social infrastructure development around the Bang Saphan area and the introduction of the concept of "Free Trade Area" (FTA).

G.2.3 Financial Viability

(1) Method of Financial Analysis

The financial evaluation is to be made from two aspects, one for assessing the project as a whole where the project is wholly financed from the developer's own fund (no debt financing), and the other for assessing the project from the investor's viewpoint where the return on equity is highlighted, incorporating debt, interest, repayment, etc..

The former is called "all capital" approach, and the latter "equity capital" approach. As mentioned in the previous section G.2.1, the project evaluation has been made principally by the "equity capital" approach method.

The former is evaluated in terms of "Return on Investment" (ROI) based on the cashflow streams of revenues and expenses/cost. The latter is evaluated in terms of "Return on Equity" (ROE), that is, the profitability of the equity capital.

The internal rate of return is the discount rate at which the present value of cash inflows is equal to the present value of cash outflows. In other words, it is the discount rate at which the present value of the net receipts from the project is equal to the present value of the investment.

ROI is determined as a discount rate that equalizes the present value of the streams of capital investment and gross profit over the project life (30 years).

ROE is determined as a discount rate that equalizes the present value of the streams of equity capital and profit after interest and corporate tax plus depreciation over the project life (30 years).

(2) Preconditions and Assumptions

1. Land Valuation

It is assumed that the transaction related to the transfer of land right takes place when the J/V is established. At the time of land transfer, the cash corresponding to the agreed amount of the land concerned is to be paid from the J/V to the private land holder.

The land acquisition cost for which the J/V is responsible, is estimated at 400,000 - 600,000 baht/rai on an average, corresponding to 10 - 15 15 US$/$m^2$.

The land value is estimated at 400,000 baht/rai (10 US$/$m^2$) for the base case.

The amount of land compensation is included in the land acquisition cost in this study. Therefore, the private land holder shall be fully responsible for relocation of the inhabitants in the area.

2. Construction Cost for the Infrastructure in the I.E. and the External Infrastructure

The cost for the infrastructure construction is to be borne by the J/V, inclusive of land reclamation, road and drainage, water supply system, wastewater treatment facility, and power distribution line within the I.E.

In addition to the infrastructure construction in the I.E. for which the J/V is responsible, the external infrastructure construction for which the public sector is responsible, will be also prerequisite to the development of the Bang Saphan Industrial Estate. The external infrastructure will be taken care of by the government agencies concerned.

The cost of the power system, consisting of transmission line from the nearest sub-station operated by PEA and a substation to be constructed within the I.E., is to be borne by PEA.

The cost of the telecommunications ystem in and outside the I.E. is to be borne by TOT.

The cost of the pipeline from the reservoir to the purification plant in the I.E., is to be borne by PWA.

Supplemental Information on Water Supply System

Among public facilities, the water supply facility may be expected to be a critical factor for the external infrastructure development.

According to the rough calculation, ROI was calculated at 4.7% for the water tariff of 6.5 baht/m^3 in 2000 under the following conditions:

Capital cost	:	3,258 million baht in 1996 price
Supply capacity	:	10 MCM in 2001
		40 MCM in 2004
		60 MCM in 2010
Water tariff	:	6.5 baht/m^3
O & M cost	:	2.5 baht/m^3
Raw water cost	:	0.5 baht/m^3
Escalation rate	:	5% for water tariff and O&M cost
		3% for raw water cost

In the light of a rather low ROI, positive public support, especially financial support in the initial stage, will be required to implement the water supply scheme to meet the water demand in this region.

3. Construction Schedule

The industrial estate with a total area of 3,750 rai, being equal to 600 ha, is scheduled to be developed in three stages as follows;

	Development Area (rai)	Construction Period
Stage 1	680 rai (108 ha)	1999 - 2000
Stage 2	1,260 rai (202 ha)	2001 - 2003
Stage 3	1,810 rai (290 ha)	2004 - 2006
Total	3,750 rai (600 ha)	

4. Lot Sales to Investors

The price for lot sales is the most influential factor which affects the financial viability of the project, fully depending upon the present situation and future plan of infrastructure such as port, power, water supplying facility, etc., market conditions, and marketability of the Joint Venture company.

The lot sale schedule is as follows:

(in ha)

Lot sale	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
Phase I	10	20	15	7								52
Phase II			20	30	30	30	30	9				149
Phase III						20	30	45	40	40	39	214
Land sold	10	20	35	37	30	50	60	54	40	40	39	
Cumulative land sold	10	30	65	102	132	182	242	296	336	376	415	

5. Establishment Cost

The establishment cost, including pre-operating expenses, etc., is estimated at 0.5 million US$, being equal to 12.5 million baht.

6. Disbursement Schedule

The disbursement schedule of total cost including the price contingency, in which an inflation rate for foreign portion and local portion is assumed at 3% and 5% respectively, VAT, establishment cost and land cost, is as follows:

(1,000 US$)

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Construction Cost	0	817	847	7,140	22,533	6,738	18,040	21,000	2,183	8,337	32,391	33,931
Establishment Cost				500								
Land valued (10US$/m^2)				12,300		18,700			29,000			
Total(1,000US$)	**0**	**817**	**847**	**19,940**	**22,533**	**25,438**	**18,040**	**21,000**	**31,184**	**8,337**	**32,391**	**33,931**
(million baht)	**0**	**20.9**	**21.2**	**498.5**	**563.3**	**636.0**	**451.5**	**525.0**	**779.6**	**208.4**	**809.8**	**848.3**

7. Operation & Maintenance

O&M cost is to comprise the following, in which an inflation rate of 3% per annum is considered for most of the items.

a. Administration

Management	3 persons	2,000 US$/month	(50,000 baht/month)
Administration	10 persons	1,000 US$/month	(25,000 bath/month)
Others	20 persons	300 US$/month	(7,500 baht/month)

b. Social insurance fund
10% of the above a.

c. Training
20,000 US$/year for the period of 2000 - 2004 (5 years)

d. Advertisement/Promotion fee (in US$/year)
50,000 US$/year (1,250,000 baht/year) for the period of 1999 - 2008 (10 years)

e. Sales commission fee
2% of the lot sale

f. Rental fee for accommodation
3,000 US$/month (75,000 baht/month) - 3 persons

g. O&M expenses for the utilities, etc.
1.0% of the depreciable assets (approximately 50% of the construction cost)

h. Maintenance and repair
1.0% of the civil works such as road and drainage (15% of the construction cost) (for reference, the work of land reclamation (14% of the construction cost) is not subject to maintenance and repair)

i. Lot administrative charges
A fee of 0.05 US$/m2/month (2,000 baht/rai/month) is charged to each lot owner

j. Revenue from utility operation
The gross profit is assumed at 8% of the acquired cost. The value-added is estimated at 12% of the acquired cost.

8. Import Duties

Import duties are exempted.

9. Corporate Income Tax

Tax rate 30%
Tax incentives:
Tax exemption for 8 years from the beginning of the profit making period and income tax reduction of 50% for the 5 succeeding years.

10. VAT

VAT is exempted by the FTA privilege.

Utility Operation

1) Water Supply
2) Wastewater Treatment
3) I/E Maintenance (Lot administration charge)

The amount of 7% VAT to the revenues from the operation of the above items 1), 2) and 3) minus (the investment cost for the above items 2), 3) and 4)) x 7% will be in deficit in the initial years, so the corresponding amount of VAT is not payable to the Tax Office. When the accumulated amount of such VAT surpasses the investment cost for the above items 2), 3) and 4)) x 7%, the developer is responsible for paying the excess of (the above initial investment cost x 7%) to the Tax Office.

(3) Capital Contribution of the Private Company and IEAT

The capital structure in the initial stage, focusing on Phase 1, is assumed to comprise 30% equity capital and 70% debt finance as shown in Figure G.2.1.

The subsequent Phase 2 and Phase 3 development is supposed to be implemented under such a condition that the project cost be raised by debt finance and internal fund retained from lot sales operation without additional equity capital.

The resultant financial structure after the total development is expected as shown in Figure G.2.2 and summarized below:

1. Ratio of equity : 30% of the project cost for Phase 1
   215.6 million baht (8,623,000 US$)

2. Capital contribution (Provisional)
   Private Sector : 80% of the equity
   174.5 million baht (6,898,000 US$)
   IEAT : 20% of the equity
   43.1 million baht (1,725,000 US$)

3. The balance of the project cost and the above equity amount shall be funded by the Joint Venture Company through debt financing from the

financial market and/or through internal funds retained from lot sales operation.

(4) Result of Viability Analysis

The results of financial analysis are summarized in Table G.2.8 for major parameters such as sale price.

The sale price is estimated at 50 US$/m^2 for example, equal to 2.0 million baht/rai in 2000, thereafter inflated at 5.0% per annum until 2010 and no escalation after 2010. For the Base Case, the schedule of borrowing, repayment and debt outstanding is shown in Figure G.2.3.

The details of the financial analysis for the Base Case are shown in Tables G.2.9 to Table G.2.15 as indicated below:

Construction Cost Stream in 1996 price	Table G.2.9
Disbursement Schedule	Table G.2.10
Fund Raising Schedule	Table G.2.11
Debt/Capital/Repayment	Table G.2.12
Income Statement	Table G.2.13
Operation & Maintenance Expenses	Table G.2.14
Cash flow/Internal Fund/Computation of ROE & ROI	Table G.2.15

In addition, the results of financial analysis for the following cases are also presented in Table G.2.16.

1) Land price : 600,000 baht/rai
2) Land price : 200,000 baht/rai
3) VAT is applied (in case that the proposed concept "FTA" is not adopted)
4) 10% decrease in construction cost
5) Combination of 2) and 4)

G.2.4 Evaluation of the Project

The viability of the Project depends on the sale price, valuation of the land, and construction cost. An appropriate rate of return on investment (ROI) can be compared with the opportunity cost, ranging from 10% to 15% in Thailand.

An appropriate rate of return on equity capital (ROE) has to be determined in comparison

with the cost of capital, or "cut-off rate" set up by the individual investors. For reference, related indicative or informative data are provided below.

1. Average Rate of Return on the Stock Markets of Developed Countries

   Over the last decade (1981-1990), the average yield is reported to have been around 16% per annum.

2. Rate of Return for Equity Capital

   A rate of return, though it should be regarded as indicative figure representing ROE, generally has three components:

   A. Rate of return for 30-year US Treasury Bond
      As of August 1996, the prevailing rate of return for 30-year US Treasury Bond is less than 7% per annum.

   B. Credit risk premium
      The project can have a low or a high credit risk, depending upon its location and political stability of the countries. Taking into account the above factors, the credit risk premium would be rather low, say 2% to 3%.

   C. Expected inflation rate
      Investors recognize that in an inflationary economy, they are being paid back with less valuable dollars. As a result, they increase their inflation rate to compensate for their loss in purchasing power. The expected inflation would not be so low, say 5% to 7%.

Accordingly, the appropriate rate of return on equity capital could range from 14% to 17%.

The sale price of 50 US$/m^2 (2.0 million baht/rai) appears to be competitive in comparison with the lot sale price prevailing in other Asian countries as shown in Table G.2.17.

The project could be sufficiently viable in terms of ROI and also be viable in terms of ROE at the sale price of 50 US$/m^2 in case that the land be valued at less than 10 US$/m^2.

For a supplemental study in which only the implementation of Phase 1 is focused, the project is marginally viable in terms of ROI being calculated at 10.4%, slightly above the opportunity cost, but is not financially viable in terms of ROE being calculated at 12.8%, rather below the appropriate rate of return.

The project could be sufficiently viable from the economic viewpoint, judging from the

fact that EIRR is calculated at more than the opportunity cost, say 10 - 15% in Thailand. The project could be expected to significantly contribute to the economic growth as well as the regional industrialization in the Bang Saphan area.

On the other hand, from the financial viewpoint, the project could be viable at the sale price of 50 US$/$m^2$ in case that the land is valued at less than 10 US$/$m^2$.

It should be noted that, to make the project economically and financially viable, direct investment, not limited to Foreign Direct Investment (FDI), is vital to the success of the project as well as to the industrial development around the Bang Saphan area. In that respect, the Thai Government is advised to show a strong willingness to attract foreign investment by financially supporting the infrastructure development in the Bang Saphan area, especially showing a positive attitude to develop water resources for industrial water supply.

Table G.2.1 Inflows and Outflows for Economic and financial Analysis

1. Economic Analysis of the Project

EIRR = Economic Internal Rate of Return

Economic costs	Sources of fund	Economic Benefits
1. I/E development cost	Developer	Value-added generated by
2. External infrastructure cost	National Budget	"Industrial operator" in I/E
3. Investment cost of "Industrial operator" (including "working capital")	Industrial Operators	

2. Financial Analysis of the Project

a) "All capital" method

ROI = Return of Investment

Financial costs	Sources of fund	Financial Benefits
1. Development cost *1	Developer *2	Revenue from lot sale
2. O/M cost		

*1 Inclusive of land acquisition cost and development cost of I/E.

*2 Developer's own funds
(No debt financing)

b) "Equity capital" method from the viewpoint of equity participants

ROE = Return on equity

Financial costs	Sources of fund	Net cash flow
1. Development cost		Net cash flow
Equity	Equity from the developer	(Income after tax,
Debt	Borrowing from the bank	depreciation and
2. O/M cost		repayment)

Table G.2.2 "Capital Investment per employee" for Petrochemical Industries

CHEMICAL

Name	Total employee	US$/ employee	Name	Total employee	US$/ employee
1 A.F. Goodrich Chemicals Co., Ltd.	48	41,667	43 PQ-Chemicals (Thailand) Co., Ltd.	70	57,143
2 Advance Paint & Chemical (Thailand) Ltd.	120	66,667	44 Promatet Industry Co., Ltd.	134	8,955
3 Applied Chemical Industry Co., Ltd.	120	3,333	45 Q-Fac Co., Ltd.	17	47,059
4 Asia Pacific Chemicals Co., Ltd.	150	108,000	46 Riotex Polymer Co., Ltd.	120	16,667
5 Asian Chemical Co., Ltd.	348	18,391	47 Sak Chaisidhi Co., Ltd.	61	327,869
6 Asian PVS Chemical Co., Ltd. (APC)	15	266,667	48 Sando Product Ltd.	50	240,000
7 Bangkok Nanyang Chemical Co., Ltd.	100	40,000	49 Seng Thai Industry Co., Ltd.	50	32,000
8 Bangkok Polyethylene	300	666,667	50 Shin Fu Dying Co., Ltd.	120	20,000
9 Bangkok Systhetics Co., Ltd. (BST)	70	971,429	51 Siam Chemical Industry Co., Ltd.	300	266,667
10 Bara Chemical Co., Ltd	44	9,091	52 Siam Occidental Electrochemical Co., Ltd.	200	380,000
11 Bayer Laboratories Ltd.	75	26,667	53 Siam Synthetic Latex Co., Ltd.	-	-
12 Bayer Thai Co., Ltd.	149	18,792	54 Sigma Paints (Thailand) Co., Ltd.	100	6,000
13 Chemophile Co., Ltd.	-	-	55 SIK (Thailand) Co., Ltd.	90	13,333
14 Ciba-Geigy (Thailand) Co., Ltd.	53	188,679	56 Standard Manufacturing Co., Ltd.	70	5,714
15 Citric Acid Industry Co., Ltd	135	-	57 Sunco Chemicals & Paints Co., Ltd.	60	16,667
16 Courtaulds Coating (Thailand) Ltd.	-	-	58 Superior Chemical Industry (Thailand) Co., Ltd.	70	2,857
17 Dee Thai Chemical Industrial Co., Ltd.	10	160,000	59 Thai Epoxy and Allied Products Co., Ltd.	200	170,000
18 Diversey Thailand Ltd.	39	4,103	60 Thai Eruo Coat Ltd.	5	112,000
19 DU PONT (Thailand) Co., Ltd.	40	40,000	61 Thai GCI Resitop Co., Ltd.	46	260,870
20 Eternal Petrochemical Co., Ltd.	169	392,899	62 Thai Herbicide Co.,Ltd	50	8,000
21 FomoThai Corporation Co., Ltd.	20	60,000	63 Thai Kawaken Co., Ltd	113	17,699
22 Global Chemical Co., Ltd.	150	13,333	64 Thai Kiwa Chemicals Co., Ltd.	20	100,000
23 Goshu Chemical Co., Ltd.	85	26,353	65 Thai Mitsui Toatsu Co., Ltd.	98	191,837
24 Hartford Paint Co., Ltd	30	66,667	66 Thai Nan Pao Resins Chemical Co., Ltd.	35	182,857
25 HMC Polymers Co., Ltd.	250	88,000	67 Thai Olefins Co., Ltd.	400	1,870,000
26 HMT Polystyrene	96	250,000	68 Thai Parkerizing Co., Ltd.	28	40,000
27 Hwa Tai Industry Co., Ltd.	50	92,000	69 Thai Parkerizing Co., Ltd.	38	29,474
28 ICI Asiatic Chemical Co., Ltd.	82	56,098	70 Thai Plastic and Chemicals Public Co., Ltd.	317	416,404
29 Lam Soon (Thailand) Co., Ltd.	330	36,364	71 Thai Polypropylene Co., Ltd.	100	960,000
30 Laport (Thailand)	38	-	72 Thai Shikong Industry Corp., Ltd.	100	8,000
31 Mosanto Premier Kasei	242	60,826	73 Thai-Occidental Chemical Ltd.	72	41,667
32 Nagshima Special Paint (Thailand) Co., Ltd.	18	17,778	74 Thaiwashin Co., Ltd.	36	44,444
33 Nap Stoller Co., Ltd.	26	61,538	75 Thaiwin Fiber Industry Co., Ltd.	63	6,349
34 National Fertilizer (NFC)	600	23,000	76 Thep Watana Chemical Co., Ltd.	62	9,677
35 National Petrochemical Public Co., Ltd.	760	478,947	77 TOA-Chugoku Paints Co., Ltd.	120	60,000
36 Nippon Paint (Thailand) Co., Ltd.	740	432	78 TS Chemical Co., Ltd.	24	83,333
37 Oriental Silica Ltd.	90	177,778	79 Ueno Fine Chemicals Industry(Thailand)Ltd.	181	24,309
38 Pacific Plastic (Thailand) Co., Ltd.	38	497,937	80 V. Brother Industry Co., Ltd.	45	4,444
39 Pato Chemical Industry Public Co., Ltd.	220	25,455	81 Vinythai Public Co., Ltd.	500	896,000
40 Peroxythai Ltd.	89	449,438	82 Ying Charoen Paint Industry Co., Ltd.	43	2,790,698
41 Pompat Chemicals Co., Ltd.	80	75,000	83 Yip In Tsoi & Jacks Co., Ltd.	60	33,333
42 Power Coating Co., Ltd.	30	9,333			

Medium (50%)	51,578 US$	1,300,000 baht
Quartile (75%)	189,468 US$	4,700,000 baht

Table G.2.3 Capital Investment per employee for Iron and Steel Industries

IRON and STEEL

Name	Total employee	US$/employee
1 Amagasaki Pipe (Thailand) Co., Ltd.	56	14,286
2 Bangkok Industrial Laminate Co., Ltd.	110	7,273
3 Bangkok Maillieable Iron & Steel Co., Ltd.	120	200,000
4 Bangpoo Engineering Co., Ltd.	200	6,560,000
5 Central Metals (Thailand) Co., Ltd.	122	45,902
6 Chiao Pao Metal Co., Ltd	140	34,286
7 CS. Metral Co., Ltd.	225	21,333
8 De-Sta-Co (Asia) Co., Ltd.	35	57,143
9 Jaques (Thailand) Co., Ltd.	26	923,077
10 Lohaprateep Industry Co., Ltd.	500	16,000
11 Menam Stainless Wire Co., Ltd.	60	40,000
12 Metal Co., Ltd.	60	13,333
13 Metropolis Engineering Co., Ltd.	100	20,000
14 Nicco Steel Co., Ltd.	120	866,667
15 NSL Industry Co., Ltd.	100	-
16 Oriental Copper Co., Ltd.	100	224,000
17 P.S. Metalworks Co., Ltd.	250	40,000
18 Pacific Pipe Co., Ltd.	50	160,000
19 Padaeng Poongsan Metals Co., Ltd. (PPM)	300	240,000
20 Precision Manufacturing Co., Ltd.	80	60,000
21 Siam Hi-Tech Steel Center Co., Ltd.	154	-
22 Siam IKK Co., Ltd	60	32,000
23 Siam Technic Industry Co., Ltd.	140	57,143
24 Siam Tinplate Co., Ltd.	379	211,082
25 Siam Yamato Steel Co., Ltd.	400	600,000
26 Summit Advanced Materials Co., Ltd.	28	257,143
27 Thai Patthana Industry Co., Ltd.	350	137,143
28 Thai Sangkasi Thai Co., Ltd.	120	100,000
29 Thai Scandic Steel Co., Ltd.	210	70,476
30 Thai Steel Galvannized Co., Ltd.	80	20,000
31 Toyo Valve (Thailand) Co., Ltd.	60	53,333
32 Union Tomita (Thailand) Co., Ltd.	235	6,809
33 Union Zojirushi Co., Ltd.	300	18,667

Medium (50%)	55,238 US$	1,380,000 baht
Quartile (75%)	202,770 US$	5,069,000 baht

Table G.2.4 Economic Analysis (Base Case)

EIRR Calculation

VALUE-ADDED is estimated at a growth of 0% after 2010 up to 2015 and 0 % onwards.

Investment = Investment capital + Working capital (30%) of the investment capital

(1,000 US$)

		I/E Infrastructure Development Investment					External Infrastructure Development Investment						Enterprise Activities					Balance
		Phase I	Phase II	Phase III	Total	1% O & M	Port	Water	Power/Road	Others	Total	1% Value-added	No. of jobs created	Investment (3) Capital	Investment (3) Working	Value-added (4)	(4)/ Total (3)	(4) - (1) - (2) - (3)
	1996																	-796
1	1997	788			788	8	0	0	0	0	0							-16,896
2	1998	788	0		788	16	16,092	0	0	0	16,092							-52,118
3	1999	5,113	1,142		6,255	78	32,185	6,016	7,248	336	45,785		1,208	77,280	23,184			-182,995
4	2000	17,823	1,142		18,965	268	32,587	6,016	9,359	15,336	63,298		1,208	77,280	23,184			-132,603
5	2001	0	5,353		5,353	321	0	10,824	640	15,000	26,464					226,279		199,693
6	2002	0	13,926	0	13,926	461	0	12,628	1,226	0	13,854	1,655				226,279		194,967
7	2003		13,964	1,630	15,594	617	0	15,018	1,908	0	16,926	1,824				294,397		233,472
8	2004		0	1,630	1,630	633	0	0	0	0	0	1,824	727	46,528	13,958	396,573		262,133
9	2005			5,523	5,523	688	32,587	0	7,134	0	39,721	2,221	1,091	69,792	20,938	566,868		297,095
10	2006			20,930	20,930	898	64,772	19,844	15,335	0	99,951	3,221	1,818	116,320	34,896	747,870		629,252
11	2007			20,984	20,984	1,107	65,577	19,844	15,335	0	100,755	4,228				892,993		778,793
12	2008			0	0	1,107	0	19,844	0	0	19,844	4,427	1,174	75,136	22,541	1,038,117		923,668
13	2009				0	1,107	0	20,295	0	0	20,295	4,630	1,174	75,136	22,541	1,255,803		1,112,810
14	2010				0	1,107	0	0	0	0	0	4,630	1,761	112,704	33,811	1,370,226	138%	1,227,233 49%
15	2011				0	1,107	0	0	0	0	0	4,630	1,761	112,704	33,811	1,370,226		1,373,749
16	2012				0	1,107	0	0	0	0	0	4,630				1,370,226		1,373,749
17	2013				0	1,107	0	0	0	0	0	4,630				1,370,226		1,373,749
18	2014				0	1,107	0	0	0	0	0	4,630				1,370,226		1,373,749
19	2015				0	1,107	0	0	0	0	0	4,630				1,370,226	138%	1,373,749 51%
20	2016				0	1,107	0	0	0	0	0	4,630				1,370,226		1,373,749
28	2024				0	1,107					0	4,630				1,370,226		1,373,749
29	2025				0	1,107					0	4,630				1,370,226		1,373,749 51%
30	2026																	
	1,000 US$	24,512	35,527	50,696	110,735	26,135	243,800	130,328	58,184	30,672	462,984	102,738	11,920	762,880	228,864	27,568,798		26,079,938
					8%						35%			57%				
	Million Baht	613	888	1,267	2,768	653	6,095	3,258	1,455	767	11,575	2,568		19,072	5,722	689,220		651,998
						0.1%												

Sensitivity Analysis

Capital cost (baht)= 1,600,000 Capital cost (US$)= 64,000 51.2%

		Thailand	EIRR
1,600,000	Baht/employee	64,000	51.2%
2,400,000	Baht/employee	96,000	45.0%
4,000,000	Baht/employee	160,000	36.0%

Basic Data

	Value-added per employee (US$)	(1,000 Baht)
2001	93,697	2,342
2006	123,615	3,090
2011	114,952	2,874

EIRR = **51.2%**

Table G.2.5 Economic Analysis (Sensitivity)

EIRR Calculation

VALUE-ADDED is estimated at a growth of 0% after 2010 up to 2015 and 0 % onwards.

(1,000 US$) 0 Investment = Investment capital + Working capital (30%) of the investment capital

		I/E Infrastructure Development					External Infrastructure Development						Enterprise Activities					Balance
		Investment				1%	Investment					1%	No. of	Investment (3)		Value-added	(4)/	
		Phase I	Phase II	Phase III	Total	O & M	Port	Water	Power/Road	Others	Total	Value-added	jobs created	Capital	Working	(4)	Total (3)	(4) - (1) - (2) - (3)
	1996																	
1	1997	788			788	8	0	0	0	0	0							-796
2	1998	788	0		788	16	1,600	0	0	0	1,600							-2,404
3	1999	5,113	1,142		6,255	78	3,200	2,668	5,908	336	12,112							-18,445
4	2000	17,823	1,142		18,965	268	3,240	2,668	7,880	786	14,574		1,208	77,280	23,184			-134,271
5	2001	0	5,353		5,353	321	0	4,800	640	450	5,890		1,208	77,280	23,184			-112,029
6	2002	0	13,926	0	13,926	461	0	5,600	1,088	0	6,688	409				226,279		205,613
7	2003		13,964	1,630	15,594	617	0	6,660	1,628	0	8,288	492				226,279		202,272
8	2004		0	1,630	1,630	633	0	0	0	0	0	492	727	46,528	13,958	294,397		232,139
9	2005			5,523	5,523	688	3,240	0	5,840	0	9,080	582	1,091	69,792	20,938	396,573		291,135
10	2006			20,930	20,930	898	6,440	8,800	12,100	0	27,340	856	1,818	116,320	34,896	566,868		367,340
11	2007			20,984	20,984	1,107	6,520	8,800	12,100	0	27,420	1,130				747,870		699,488
12	2008			0	0	1,107	0	8,800	0	0	8,800	1,218	1,174	75,136	22,541	892,993		786,627
13	2009				0	1,107	0	9,000	0	0	9,000	1,308	1,174	75,136	22,541	1,038,117		931,641
14	2010				0	1,107	0	0	0	0	0	1,308	1,761	112,704	33,811	1,255,803		1,109,488
15	2011				0	1,107	0	0	0	0	0	1,308	1,761	112,704	33,811	1,370,226	138%	1,223,912 66%
16	2012				0	1,107	0	0	0	0	0	1,308				1,370,226		1,370,427
17	2013				0	1,107	0	0	0	0	0	1,308				1,370,226		1,370,427
18	2014				0	1,107	0	0	0	0	0	1,308				1,370,226		1,370,427
19	2015				0	1,107	0	0	0	0	0	1,308				1,370,226		1,370,427
20	2016				0	1,107	0	0	0	0	0	1,308				1,370,226	138%	1,370,427 67%
28	2024				0	1,107	0	0	0	0	0	1,308				1,370,226		1,370,427
29	2025				0	1,107					0	1,308				1,370,226		1,370,427
30	2026				0	1,107					0	1,308				1,370,226		1,370,427 68%
	1,000 US$	24,512	35,527	50,696	110,735	26,135	24,240	57,796	47,184	1,572	130,792	28,720	11,920	762,880	228,864	27,568,798		26,338,112
					11%						13%			76%				
	Million Baht	613	888	1,267	2,768	653	606	1,445	1,180	39	3,270	718		19,072	5,722	689,220		658,453
						0.1%												

Sensitivity Analysis

Capital cost (baht)=	1,600,000		Capital cost (US$)=	64,000	67.5%
				Thailand	EIRR
	1,600,000	Baht/employee		64,000	67.5%
	2,400,000	Baht/employee		96,000	56.0%
	4,000,000	Baht/employee		160,000	41.9%

Basic Data

	Value-added per employee	
	(US$)	(1,000 Baht)
2001	93,697	2,342
2006	123,615	3,090
2011	114,952	2,874

EIRR = 67.5%

Table G.2.6 Summary of Economic Analysis

	Capital investment per employee	External infrastructure cost	EIRR
Base Case	1.6 million baht/employee	11,575 million baht	51.2%
Sensitivity Analysis			
	4.0 million baht/employee	11,575 million baht	36.0%
	4.0 million baht/employee	3,270 million baht	41.9%
	1.6 million baht/employee	3,270 million baht	67.5%

Table G.2.7 **Financial Viability for the "West Water"**

Basic Parameters

Capital Cost=	3,258	Million Baht	(in 1996 price)	
Unit Cost=	54.3	Baht/m3	(in 1996 price)	
Supply Capacity =	60	MCM/year	in 2010	
Water Tariff				
Water Tariff =	6.5	Baht/m3 in	2000	Wholesale of raw water to I/Es and others
O & M cost=	2.5	Baht/m3 in	2000	
Raw water cost=	0.5	Baht/m3 in	2000	Purchase of raw water from RID

ROI = 4.7%

Tariff Escalation			
Water Tariff	5%	First 10 years	
	0%	there-after	
O & M cost	5%	First 10 year	
	0%	there-after	
Raw water cost	3%	First 10 year	
	0%	there-after	

Water Tariff (Baht/m3)	ROI (%)
6.5	4.7%
6.0	3.6%
6.5	4.7%
7.0	5.6%
8.0	7.4%

		A	B	C		D		E				F		G	
		Investment	Net Water Supply	Tariff	Revenue	Expenses							Cap. rate	ROI =	4.7%
		(Million Baht)	(MCM)	Baht/m3	(Million Baht)	O & M Cost (Million Baht)		Raw Water		Total	O&M/Revenue	Gross Profit		Net Cashflow	
	1996														
	1997	364		0	0.0	0		0		0				-364	
	1998	375		0	0.0	0		0		0		0	0.0%	-375	
	1999	556		0	0.0	0		0		0		0	0.0%	-556	
1	2000	669		6.50	0.0	2.50	0	0.50	0	0		0	0.0%	-669	
2	2001	819	10.0	6.83	68.3	2.63	26	0.52	5	31	46%	37	1.1%	-782	
3	2002	0	10.0	7.17	71.7	2.76	28	0.53	5	33	46%	39	1.2%	39	
4	2003	0	10.0	7.52	75.2	2.89	29	0.55	5	34	46%	41	1.3%	41	
5	2004	296	40.0	7.90	316.0	3.04	122	0.56	23	144	46%	172	5.3%	-124	
6	2005	305	40.0	8.30	331.8	3.19	128	0.58	23	151	45%	181	5.6%	-124	
7	2006	314	40.0	8.71	348.4	3.35	134	0.60	24	158	45%	191	5.8%	-123	
8	2007	330	40.0	9.15	365.8	3.52	141	0.61	25	165	45%	201	6.2%	-130	
9	2008	0	40.0	9.60	384.1	3.69	148	0.63	25	173	45%	211	6.5%	211	
10	2009	0	40.0	10.08	403.3	3.88	155	0.63	25	180	45%	223	6.8%	223	
11	2010	0	60.0	10.08	605.0	3.88	233	0.63	38	271	45%	334	10.3%	334	
12	2011	0	60.0	10.08	605.0	3.88	233	0.63	38	271	45%	334	10.3%	334	
13	2012	0	60.0	10.08	605.0	3.88	233	0.63	38	271	45%	334	10.3%	334	
14	2013	0	60.0	10.08	605.0	3.88	233	0.63	38	271	45%	334	10.3%	334	
15	2014	0	60.0	10.08	605.0	3.88	233	0.63	38	271	45%	334	10.3%	334	
25	2024		60.0	10.08	605.0	3.88	233	0.63	38	271	45%	334	10.3%	334	
26	2025		60.0	10.08	605.0	3.88	233	0.63	38	271	45%	334	10.3%	334	
27	2026		60.0	10.08	605.0	3.88	233	0.63	38	271	45%	334	10.3%	334	
28	2027		60.0	10.08	605.0	3.88	233	0.63	38	271	45%	334	10.3%	334	
29	2028		60.0	10.08	605.0	3.88	233	0.63	38	271	45%	334	10.3%	334	
30	2029		60.0	10.08	605.0	3.88	233	0.63	38	271	45%	334	10.3%	334	
	Total	4,028			14,465		5,564		921	6,484		7,981		3,953	

Table G.2.8 Summary of Financial Analysis

Case 1 (Base Case)

		Sale's price	ROI	ROE
Land price	10 US$/m² (400,000 baht/rai)	44	10.5%	6.6%
		49	13.1%	14.3%
		50	13.6%	16.4%
		51	14.2%	18.8%
		55	16.4%	30.0%

Table G.2.9 Construction Cost Stream in 1996 price

(1,000 baht in 1996)

1 Total Project	1997 F/C	1997 L/C	1997 Total	1998 F/C	1998 L/C	1998 Total	1999 F/C	1999 L/C	1999 Total	2000 F/C	2000 L/C	2000 Total	2001 F/C	2001 L/C	2001 Total	2002 F/C	2002 L/C	2002 Total
I Phase 1																		
1. Direct Construction							10,440	93,820	104,260	106,633	286,504	393,137						
2. Engineering Services	11,639	6,267	17,906	11,639	6,267	17,906	7,759	4,178	11,938	7,759	4,178	11,938						
3. Sub-total	11,639	6,267	17,906	11,639	6,267	17,906	18,199	97,998	116,198	114,392	290,682	405,075						
4. Physical Contingency	1,164	627	1,791	1,164	627	1,791	1,820	9,800	11,620	11,439	29,068	40,507						
5. Total	12,803	6,894	19,697	12,803	6,894	19,697	20,019	107,798	127,817	125,832	319,750	445,582						
II Phase 2																		
1. Direct Construction													11,020	99,400	110,420	88,831	216,423	305,254
2. Engineering Services							16,870	9,084	25,953	16,870	9,084	25,953	7,310	3,936	11,246	7,310	3,936	11,246
3. Sub-total							16,870	9,084	25,953	16,870	9,084	25,953	18,330	103,336	121,666	96,141	220,359	316,500
4. Physical Contingency							1,687	908	2,595	1,687	908	2,595	1,833	10,334	12,167	9,614	22,036	31,650
5. Total							18,557	9,992	28,549	18,557	9,992	28,549	20,163	113,670	133,833	105,755	242,395	348,150
III Phase 3																		
1. Direct Construction																		
2. Engineering Services																		
3. Sub-total																		
4. Physical Contingency																		
5. Total																		
IV TOTAL																		
1. Direct Construction	0	0	0	0	0	0	10,440	93,820	104,260	106,633	286,504	393,137	11,020	99,400	110,420	88,831	216,423	305,254
2. Engineering Services	11,639	6,267	17,906	11,639	6,267	17,906	24,629	13,262	37,891	24,629	13,262	37,891	7,310	3,936	11,246	7,310	3,936	11,246
3. Sub-total	11,639	6,267	17,906	11,639	6,267	17,906	35,069	107,082	142,151	131,262	299,766	431,028	18,330	103,336	121,666	96,141	220,359	316,500
4. Physical Contingency	1,164	627	1,791	1,164	627	1,791	3,507	10,708	14,215	13,126	29,977	43,103	1,833	10,334	12,167	9,614	22,036	31,650
5. Grand-Total	12,803	6,894	19,697	12,803	6,894	19,697	38,576	117,790	156,366	144,388	329,742	474,131	20,163	113,670	133,833	105,755	242,395	348,150

	2003 F/C	2003 L/C	2003 Total	2004 F/C	2004 L/C	2004 Total	2005 F/C	2005 L/C	2005 Total	2006 F/C	2006 L/C	2006 Total	2007 F/C	2007 L/C	2007 Total	TOTAL F/C	TOTAL L/C	TOTAL Total
I Phase 1																		
1. Direct Construction																117,073	380,324	497,397
2. Engineering Services																38,797	20,891	59,688
3. Sub-total																155,870	401,215	557,085
4. Physical Contingency																15,587	40,121	55,708
5. Total																171,457	441,336	612,793
II Phase 2																		
1. Direct Construction	88,831	216,423	305,254													188,681	532,246	720,927
2. Engineering Services	7,873	4,239	12,112													56,232	30,279	86,511
3. Sub-total	96,703	220,662	317,365													244,913	562,525	807,438
4. Physical Contingency	9,670	22,066	31,737													24,491	56,252	80,744
5. Total	106,373	242,728	349,102													269,405	618,777	888,182
III Phase 3																		
1. Direct Construction							10,876	98,604	109,480	125,254	334,374	459,628	125,254	334,374	459,628	261,384	767,351	1,028,735
2. Engineering Services	24,072	12,962	37,034	24,072	12,962	37,034	10,431	5,617	16,048	10,431	5,617	16,048	11,234	6,049	17,283	80,241	43,207	123,448
3. Sub-total	24,072	12,962	37,034	24,072	12,962	37,034	21,307	104,221	125,528	135,685	339,990	475,676	136,488	340,422	476,910	341,625	810,558	1,152,183
4. Physical Contingency	2,407	1,296	3,703	2,407	1,296	3,703	2,131	10,422	12,553	13,569	33,999	47,568	13,649	34,042	47,691	34,163	81,056	115,218
5. Total	26,480	14,258	40,738	26,480	14,258	40,738	23,438	114,643	138,081	149,254	373,989	523,243	150,137	374,465	524,601	375,788	891,614	1,267,402
IV TOTAL																		
1. Direct Construction	88,831	216,423	305,254	0	0	0	10,876	98,604	109,480	125,254	334,374	459,628	125,254	334,374	459,628	567,138	1,679,921	2,247,059
2. Engineering Services	31,945	17,201	49,146	24,072	12,962	37,034	10,431	5,617	16,048	10,431	5,617	16,048	11,234	6,049	17,283	175,271	94,376	269,647
3. Sub-total	120,775	233,624	354,400	24,072	12,962	37,034	21,307	104,221	125,528	135,685	339,990	475,676	136,488	340,422	476,910	742,409	1,774,297	2,516,706
4. Physical Contingency	12,078	23,362	35,440	2,407	1,296	3,703	2,131	10,422	12,553	13,569	33,999	47,568	13,649	34,042	47,691	74,241	177,430	251,671
5. Grand-Total	132,853	256,987	389,839	26,480	14,258	40,738	23,438	114,643	138,081	149,254	373,989	523,243	150,137	374,465	524,601	816,649	1,951,727	2,768,377

Table G.2.10 DISBURSEMENT SCHEDULE

Total Project

AAA **Cost Allocation Schedule at 1996 price** (1,000 Baht)

			Total	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	Total
1	Direct Construction Cost															
		Foreign portion	567,138		0	0	10,440	106,633	11,020	88,831	88,831	0	10,876	125,254	125,254	567,138
		Local portion	1,679,921		0	0	93,820	286,504	99,400	216,423	216,423	0	98,604	334,374	334,374	1,679,921
	100%		2,247,059	0	0	0	104,260	393,137	110,420	305,254	305,254	0	109,480	459,628	459,628	2,247,059
2	Engineering Services															
		Foreign portion	175,271		11,639	11,639	24,629	24,629	7,310	7,310	31,945	24,072	10,431	10,431	11,234	175,271
		Local portion	94,376		6,267	6,267	13,262	13,262	3,936	3,936	17,201	12,962	5,617	5,617	6,049	94,376
	12.0%		269,647	0	17,906	17,906	37,891	37,891	11,246	11,246	49,146	37,034	16,048	16,048	17,283	269,647
	Sub-total (1+2)															
		Foreign portion	742,409	0	11,639	11,639	35,069	131,262	18,330	96,141	120,775	24,072	21,307	135,685	136,488	742,409
		Local portion	1,774,297	0	6,267	6,267	107,082	299,766	103,336	220,359	233,624	12,962	104,221	339,990	340,422	1,774,297
			2,516,706	0	17,906	17,906	142,151	431,028	121,666	316,500	354,400	37,034	125,528	475,676	476,910	2,516,706
3	Physical Contingency															
		Foreign portion	74,241		1,164	1,164	3,507	13,126	1,833	9,614	12,078	2,407	2,131	13,569	13,649	74,241
		Local portion	177,430		627	627	10,708	29,977	10,334	22,036	23,362	1,296	10,422	33,999	34,042	177,430
	11.2%		251,671	0	1,791	1,791	14,215	43,103	12,167	31,650	35,440	3,703	12,553	47,568	47,691	251,671
		Foreign portion	816,649	0	12,803	12,803	38,576	144,388	20,163	105,755	132,853	26,480	23,438	149,254	150,137	816,649
		Local portion	1,951,727	0	6,894	6,894	117,790	329,742	113,670	242,395	256,987	14,258	114,643	373,989	374,465	1,951,727
			2,768,377	0	19,697	19,697	156,366	474,131	133,833	348,150	389,839	40,738	138,081	523,243	524,601	2,768,377
	VAT															
		Foreign portion	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Local portion	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0.0%		0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	**Total Project Cost**															
		Foreign portion	OK	0	12,803	12,803	38,576	144,388	20,163	105,755	132,853	26,480	23,438	149,254	150,137	816,649
		Local portion	OK	0	6,894	6,894	117,790	329,742	113,670	242,395	256,987	14,258	114,643	373,989	374,465	1,951,727
	OK		2,768,377	0	19,697	19,697	156,366	474,131	133,833	348,150	389,839	40,738	138,081	523,243	524,601	2,768,377

BBB **Escalation Schedule for the Project Cost**

				1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	
Escalation for foreign portion =	3.0%	Foreign portion		0	384	780	3,577	18,122	3,211	20,522	30,539	7,064	7,143	51,331	57,688	200,361
Escalation for local portion =	5.0%	Local portion		0	345	707	18,567	71,062	31,405	82,438	104,619	6,808	63,206	235,200	265,997	880,352
	48.1%		1,080,713	0	729	1,486	22,144	89,184	34,616	102,960	135,159	13,872	70,349	286,531	323,685	1,080,713
				0	384	780	3,577	18,122	3,211	20,522	30,539	7,064	7,143	51,331	57,688	200,361
				0	345	707	18,567	71,062	31,405	82,438	104,619	6,808	63,206	235,200	265,997	880,352
			1,080,713	0	729	1,486	22,144	89,184	34,616	102,960	135,159	13,872	70,349	286,531	323,685	1,080,713

CCC **Disbursement Schedule for the Project Cost**

			1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	
		Foreign portion	0	13,187	13,583	42,153	162,510	23,375	126,277	163,392	33,544	30,581	200,585	207,824	1,017,011
		Local portion	0	7,239	7,601	136,357	400,804	145,075	324,833	361,606	21,066	177,849	609,189	640,462	2,832,079
Grand Total / Direct Construction Cost	171%	**Grand Total** 3,849,090	0	20,426	21,183	178,510	563,314	168,449	451,109	524,998	54,610	208,430	809,774	848,286	3,849,090
Grand Total / Total Project Cost	139%														

4 **Total Project Cost** *Disbursement Schedule*

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	
1 Construction cost	0	20,426	21,183	178,510	563,314	168,449	451,109	524,998	54,610	208,430	809,774	848,286	3,849,090
2 Establishment cost		0	0	12,500	0	0	0	0	0	0	0	0	12,500
3 Land valued	0	0	0	307,500	0	467,500	0	0	725,000	0	0	0	1,500,000
5,361,590 TOTAL	0	20,426	21,183	498,510	563,314	635,949	451,109	524,998	779,610	208,430	809,774	848,286	5,361,590

Table G.2.11 Fund Raising

Total Project

6 Fund Raising (1,000 Baht)		Equity allocation		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007						Total
6.1 Equity from IEAT	20%	43,113		0	0	0	43,113	0													43,113
6.2 Equity from the private sector	80%	172,454		0	50,000	62,500	59,954	0													172,454
6.4 Borrowing		4,766,914		0	0	0	395,442	563,314	560,949	326,109	399,998	779,610	208,430	684,774	848,286	0					4,766,914
6.5 Additional loan		37,500			0	0	37,500	0	0	0											37,500
		25			25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	
6.6 Internal funds	450,000								75,000	125,000	125,000	0	0	125,000						0	
Total				0	50,000	62,500	536,010	563,314	635,949	451,109	524,998	779,610	208,430	809,774	848,286	0					5,019,981
Cumulative Cash-flow				0	27,594	61,178	70,006	124,379	207,689	254,753	335,524	331,498	343,258	366,947	420,254	478,674					

7 Amortization (Straight-line method)	Rate	Amount		1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010					Total
7.1 Establishment Cost	30%	12,500					3,750	3,750	3,750	1,250											12,500
7.2	30%																				
8 Depreciation (Straight-line method)	Rate	Amount				1	2	3	4	5	5	7	8	9	10	11	12	13	14	15	Total
8.1 Architectural Construction	7%	115,473	3% of			0	1,789	1,789	1,789	4,383	4,383	4,383	8,083	8,083	8,083	8,083	8,083	8,083	8,083	8,083	115,473
8.2 Machinery & Equipment	15%	577,363	15% of			0	19,170	19,170	19,170	46,956	46,956	46,956	80,214	67,434	67,434	58,172	39,649	39,649	26,433	0	577,363
8.3 Others	15%	2,018,950	52% of			0	67,036	67,036	67,036	164,197	164,197	164,197	280,497	235,807	235,807	203,420	138,646	138,646	92,430	0	2,018,950
Total		2,711,787	70%			0	87,995	87,995	87,995	215,535	215,535	215,535	368,795	311,324	311,324	269,675	186,377	186,377	126,946	8,083	2,711,787

Table G.2.12 DEBT/CAPITAL INVESTMENT/REPAYMENT

(1,000 Baht)

			1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
Debt Outstanding (beg.)			0	0	0	0	432,942	996,257	1,557,206	1,633,316	1,783,314	2,312,923	1,871,354	1,806,128	1,929,414	1,304,414	654,414	-45,586	0	0	0	4,804,414
	Principal Repayment	4,804,414	0	0	0	0	0	0	250,000	250,000	250,000	650,000	750,000	725,000	625,000	650,000	700,000	-45,586	0			
		25 Baht or US$	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	
New Borrowing		4,766,914	0	0	0	395,442	563,314	560,949	326,109	399,998	779,610	208,430	684,774	848,286	0	0	0	0	0	0	0	4,766,914
Additional Borrowing		37,500	0	0	0	37,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Interest rate = 7%		0	0	0	13,840	50,022	89,371	120,418	128,332	152,118	169,200	154,962	156,119	135,059	91,309	45,809	-3,191	0	0	0	1,303,369
Debt Outstanding (end)			0	0	0	432,942	996,257	1,557,206	1,633,316	1,783,314	2,312,923	1,871,354	1,806,128	1,929,414	1,304,414	654,414	-45,586	0	0	0	0	
			1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Equity (beg.)			0	0	50,000	112,500	215,567	215,567	215,567	215,567	215,567	215,567	215,567	215,567	215,567	215,567	215,567	215,567	215,567	215,567	215,567	
	Additional paid-in capital	215,567	0	50,000	62,500	103,067	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	215,567
Equity (end)			0	50,000	112,500	215,567	215,567	215,567	215,567	215,567	215,567	215,567	215,567	215,567	215,567	215,567	215,567	215,567	215,567	215,567	215,567	
	Investment Cost		0	20,426	21,183	498,510	563,314	635,949	451,109	524,998	779,610	208,430	809,774	848,286	0	0	0	0	0	0	0	5,361,590
	Cumulative Investment Cost		0	20,426	41,609	540,119	1,103,433	1,739,382	2,190,492	2,715,490	3,495,100	3,703,530	4,513,304	5,361,590	5,361,590	5,361,590	5,361,590	5,361,590	5,361,590	5,361,590	5,361,590	

Table G.2.13 Income Statements — Total Project

(1,000 Baht)

						1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2026	
9	Sale's Price																									
	50	US$/m2 for the initial year	ROE= 16.4%		25					1,250	1,313	1,378	1,447	1,519	1,595	1,675	1,759	1,847	1,939	2,036	2,036	2,036	2,036	2,036		
	5%	Annual increase																								
			ROI= 13.6%				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	30	
10	INCOME STATEMENTS					1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2026	Total
	10.1	Revenue				0	0	0	0	125,000	262,500	551,250	578,813	379,846	797,676	1,005,072	879,438	738,728	775,664	814,447	0	0				6,908,433
		Lot Adm. charges		1.25	Baht/m2/month	Escalation= 3%				1,591	4,917	11,818	19,128	24,180	34,129	46,554	46,554	46,554	46,554	46,554	46,554	46,554	46,554	46,554	46,554	1,073,393
						(Operation					20%	20%	20%	50%	50%	50%	80%	80%	90%	90%	100%	100%	100%	100%	100%	
						% of Full Capacity)					40%	60%	80%	50%	70%	80%	60%	80%	90%	100%	100%	100%	100%	100%	100%	
						Operation Rate)																				
		Gross profit from Utility Operation		8%	(Cap. rate)	1,772,992					11,347	17,021	22,694	35,460	49,644	56,736	68,083	90,777	114,890	127,655	141,839	141,839	141,839	141,839	141,839	2,863,736
		VAT portion for Revenue from	Operation	0%	(VAT credit =	0)					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	OK
											0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	10.2	Cost of lot sold				0	0	0	0	62,793	125,586	251,172	251,172	156,982	313,965	376,758	313,965	251,172	251,172	251,172	0	0	0	0	0	2,605,907
					25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	
	10.3	O/M cost				0	1,980	7,733	14,831	22,196	31,083	37,607	36,532	41,393	50,489	54,711	59,648	57,580	60,565	62,163	42,844	41,151	41,245	41,343	39,280	1,183,286
	10.4		Operation profit			0	-1,980	-7,733	-14,831	41,602	122,096	291,310	322,931	241,110	516,995	676,893	620,462	567,307	625,371	675,322	145,549	147,242	147,148	147,050	149,113	7,056,369
	10.5	Amortization				0	0	0	0	0	3,750	3,750	3,750	1,250	0	0	0	0	0	0	0	0	0	0	0	12,500
	10.6	Depreciation				0	0	0	0	0	87,995	87,995	87,995	215,535	215,535	215,535	368,795	311,324	311,324	269,675	186,377	186,377	126,946	8,083	0	2,711,787
	10.7	Interest				0	0	0	13,840	50,022	89,371	120,418	128,332	152,118	169,200	154,962	156,119	135,059	91,309	45,809	-3,191	0	0	0	0	1,303,369
	10.8		Profit before tax			0	-1,980	-7,733	-28,672	-8,420	-59,021	79,147	112,854	-127,793	132,260	306,396	95,548	120,923	222,738	359,837	-37,637	-39,136	20,202	138,967	149,113	3,028,713
	10.9	Corporate Tax	30%			0	0	0	0	0	0	0	0	0	0	0	0	0	33,411	53,976	0	0	3,030	41,690	44,734	657,177
											0%	0%	0%	0%	0%	0%	0%	0%	15%	15%	0%	0%	15%	30%	30%	
	10..		Profit after tax			0	-1,980	-7,733	-28,672	-8,420	-59,021	79,147	112,854	-127,793	132,260	306,396	95,548	120,923	189,328	305,862	-37,637	-39,136	17,172	97,277	104,379	2,371,537
	10.b		Cumulative profit			0	-1,980	-9,713	-38,385	-46,805	-105,826	-26,679	86,175	-41,618	90,642	397,037	492,585	613,509	802,836	1,108,698	1,071,061	1,031,925	1,049,097	1,146,374	2,371,537	

Table G.2.14 Operation & Management Expenses

				Total Project	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	30	
					1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2026	Total
5 Operation & management Cost					72	258	271	285	299	314	330	346	363	382	401	421	442	464	249	249	249	249	249	8,630
5.1 Administration					18	57	60	63	66	69	72	76	80	84	88	92	97	102	68	68	68	68	68	
	Management	1,500	US$/month/person	3	36	126	132	139	146	153	161	169	177	186	195	205	216	226	113	113	113	113	113	
	Administration	1,000	US$/month/person	10	18	76	79	83	88	92	96	101	106	112	117	123	129	136	68	68	68	68	68	
	Others	300	US$/month/person	20	7	26	27	28	30	31	33	35	36	38	40	42	44	46	25	25	25	25	25	863
5.2 Social insurance fund		10%	of Administration cost																					163
5.3 Training		20,000	US$/year				20	21	22	23	24	26	27											500
5.4 Advertisement/Promotion		50,000	US$/year				50	50	50	50	50	50	50	50	50	50								
5.5 Water related charges		0	US$/year				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.6 Sale's fee		2.0%	of 4.1		0	0	0	100	210	441	463	304	638	804	704	591	621	652	0	0	0	0	0	5,527
5.6a Hired Fee		0	36,000 US$/month		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.7 Rental fee for accomodation		36	3,000 US$/month				198	208	219	230	145	152	160	168	117	123	129	136	143	75	79	83		2,636
5.7a Misc. cost		24	2,000 US$/month			25	26	28	29	31	32	34	35	37	39	41	43	45	45	45	45	45	45	1,170
5.8 O&M for Utilities & Adm. Center		1.0%	of Depreciable Assets		0	0	0	0	217	217	217	542	542	542	868	868	976	976	1,085	1,085	1,085	1,085	1,085	23,321
5.9 Maintenance & Repair		1.0%	of Civil works		0	0	0	167	167	167	167	167	167	167	167	167	167	167	167	167	167	167	167	4,521
Total				in 1,000 US$	79	309	593	888	1,243	1,504	1,461	1,656	2,020	2,188	2,386	2,303	2,423	2,487	1,714	1,646	1,650	1,654	1,571	47,331
				in 1,000 baht	1,980	7,733	14,831	22,196	31,083	37,607	36,552	41,393	50,489	54,711	59,648	57,580	60,565	62,163	42,844	41,151	41,245	41,343	39,280	1,183,286

Table G.2.15 CASH FLOW/INTERNAL FUND/COMUTATION OF ROI & ROE

(1,000 Baht)

CASH - FLOW			1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2026	Total
Net - Profit (Profit after tax) 10.a			0	-1,980	-7,733	-28,672	-8,420	-59,021	79,147	112,854	-127,793	132,260	306,396	95,548	120,923	189,328	305,862	-37,637	-59,136	17,172	97,277	104,379	2,371,537
Plus: Amortization			0	0	0	0	0	3,750	3,750	3,750	1,250	0	0	0	0	0	0	0	0	0	0	0	12,500
Depreciation			0	0	0	0	0	87,995	87,995	87,995	215,535	215,535	215,535	368,795	311,524	311,324	269,675	186,377	186,377	126,946	8,083	0	2,711,787
Cost of land leased (10.2)			0	0	0	0	62,793	125,586	251,172	251,172	156,982	313,965	376,758	313,965	251,172	251,172	251,172	0	0	0	0	0	2,605,907
Minus: Capital Cost (= Investment Cost)			0	20,426	21,183	498,510	563,314	635,949	451,109	524,998	779,610	208,430	809,774	848,286	0	0	0						5,361,590
Repayment		4,804,414	0	0	0	0	0	0	250,000	250,000	250,000	650,000	750,000	725,000	625,000	650,000	700,000	-45,586	0	0	0	0	4,804,414
Internal funds		450,000		0	0	0	0	75,000	125,000	125,000	0	0	125,000	0	0	0	0	0	0	0	0		450,000
Plus: Debt+Equity		4,982,481	0	50,000	62,500	498,510	563,314	560,949	326,109	399,998	779,610	208,430	684,774	848,286	0	0	0	0	0	0	0		4,982,481
Additional loan to make up for cash shotage		37,500	0	0	0	37,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		37,500
Cash - Flow			0	27,594	33,583	8,828	54,373	83,310	47,064	80,771	-4,026	11,760	23,689	53,307	58,419	101,824	126,709	194,326	147,242	144,118	105,360	104,379	2,555,708
Cumulative Cashflow			0	27,594	61,178	70,006	124,379	207,689	254,753	335,524	331,498	343,258	366,947	420,254	478,674	580,497	707,206	901,532	1,048,774	1,192,892	1,298,252	2,555,708	
	25	in terms of US$	0	1,104	2,447	2,800	4,975	8,308	10,190	13,421	13,260	13,730	14,678	16,810	19,147	23,220	28,288	36,061	41,951	47,716	51,930	102,228	
Internal fund (beg.)				0	27,594	61,178	70,006	124,379	132,689	54,753	10,524	6,498	18,258	-83,053	-29,746	28,674	130,497	257,206	451,532	598,774	742,892	2,001,329	
Internal fund used				0	0	0	0	75,000	125,000	125,000	0	0	125,000	0	0	0	0	0	0	0	0	0	
Cumulative internal fund				0	0	0	0	75,000	200,000	325,000	325,000	325,000	450,000	450,000	450,000	450,000	450,000	450,000	450,000	450,000	450,000	450,000	
Internal fund retained (end) as cash				27,594	61,178	70,006	124,379	132,689	54,753	10,524	6,498	18,258	-83,053	-29,746	28,674	130,497	257,206	451,532	598,774	742,892	848,252	2,105,708	

COMPUTATION OF ROE

			1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2026	Total
	Equity Portion	-215,567	0	-50,000	-62,500	-103,067	0	0	0														-215,567
	Cash-outflow (Internal fund)		0	0	0	0	0	-75,000	-125,000	-125,000	0	0	-125,000	0	0	0	0	0	0	0	0	0	-450,000
(Total Cash inflow) / Equity	Cashflow from operation	ROE=	0	27,594	33,583	8,828	54,373	83,310	47,064	80,771	-4,026	11,760	23,689	53,307	58,419	101,824	126,709	194,326	147,242	144,118	105,360	104,379	2,555,708
= 38%	Net Cashflow	16.4%	0	-22,406	-28,917	-94,239	54,373	8,310	-77,936	-44,229	-4,026	11,760	-101,311	53,307	58,419	101,824	126,709	194,326	147,242	144,118	105,360	104,379	1,890,140
																				532,328			
			1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2026	
14 **Financial FIRR (ROI)**			0	-20,426	-21,183	-498,510	-563,314	-635,949	-451,109	-524,998	-779,610	-208,430	-809,774	-848,286	0	0	0						-5,361,590
	Land Valued	1,500,000	0	-1,980	-7,733	-14,851	104,395	247,681	542,482	584,103	398,092	830,959	1,053,651	934,426	818,478	876,543	926,493	145,549	147,242	147,148	147,050	149,113	9,662,276
	ROI =	13.6%	0	-22,406	-28,917	-513,341	-458,919	-388,268	91,372	59,105	-381,517	622,529	243,876	86,141	818,478	876,543	926,493	145,549	147,242	147,148	147,050	149,113	4,300,686

Table G.2.16 Summary of Sensitivity Analysis

		Sale's price	ROI	ROE
Land price	15 US$/m²	53	10.9%	9.1%
	(600,000 baht/rai)	55	11.8%	13.9%
		56	12.2%	16.9%

		Sale's price	ROI	ROE
Land price	5 US$/m²	36	10.5%	-
	(200,000 baht/rai)	43	14.9%	14.5%
		44	15.5%	16.2%

		Sale's price	ROI	ROE
Land price	10 US$/m²	46	10.6%	-
	(400,000 baht/rai)	50	12.6%	13.8%
VAT imposition		51	13.1%	16.1%

		Sale's price	ROI	ROE
Land price	10 US$/m²	42	10.9%	-
	(400,000 baht/rai)	47	13.8%	15.1%
Construction cost : 10% decrease		48	14.3%	17.2%
		60	15.7%	34.2%

Combination case		Sale's price	ROI	ROE
		33	10.5%	-
Land price	5 US$/m²	38	13.8%	10.9%
	(200,000 baht/rai)	41	15.9%	15.1%
Construction cost : 10% decrease		42	16.6%	16.7%

Table G.2.17 Land Price (Free-hold) in Asian countries

(in US$/m²)

	Malaysia (Kuala Lumpur)	Indonesia (Jakarta)	Thailand (Bangkok)
Average Price	85-128	60-66	82.5

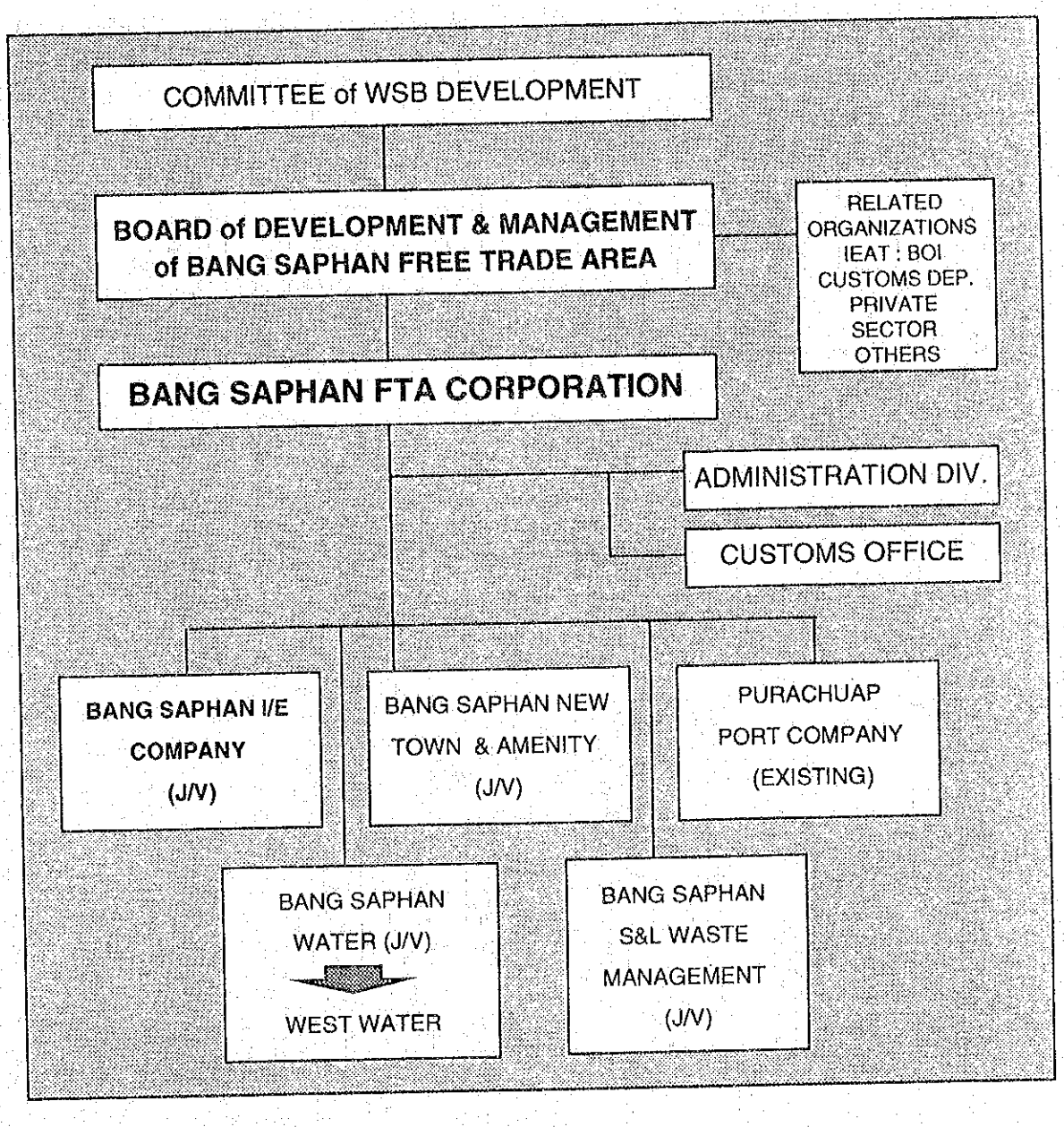
(As at 1995.9)

Land Price (GIZ) in Thailand

	Bangpoo 2	Wellgrow	Bang pakong 2	Bang pakong 3
Km from BKK	34km/East	36km/East	57km/East	57km/East
million Baht/	3.3	3.3	2.7-2.9	2.9
US$/m²	82.5	82.5	67.5-72.5	72.5

	Ban-Wa(Hitech)	Easter	Saraburi	Nong Kae
Km from BKK	60km/North	190km/south-eastrn	120km/North	93km/North
million Baht/	2.6	3.6	1.7	2.2
US$/m²	65	90	42.5	55

	Gateway City	Samutsakhon	Saharattananakorn	Southern (Chalung)
Km from BKK	82km/East	50km/West	82km/North	30km/South of Songkhla
million Baht/	3.2	3.2	1.5	990.000
US$/m²	55	80	37.5	24.7



JAPAN INTERNATIONAL COOPERATION AGENCY
INDUSTRIAL ESTATE AUTHORITY OF THAILAND MINISTRY OF INDUSTRY
FEASIBILITY STUDY ON BANG SAPHAN INDUSTRIAL ESTATE IN THE KINGDOM OF THAILAND
Figure G.1.1 Integrated Development Organization
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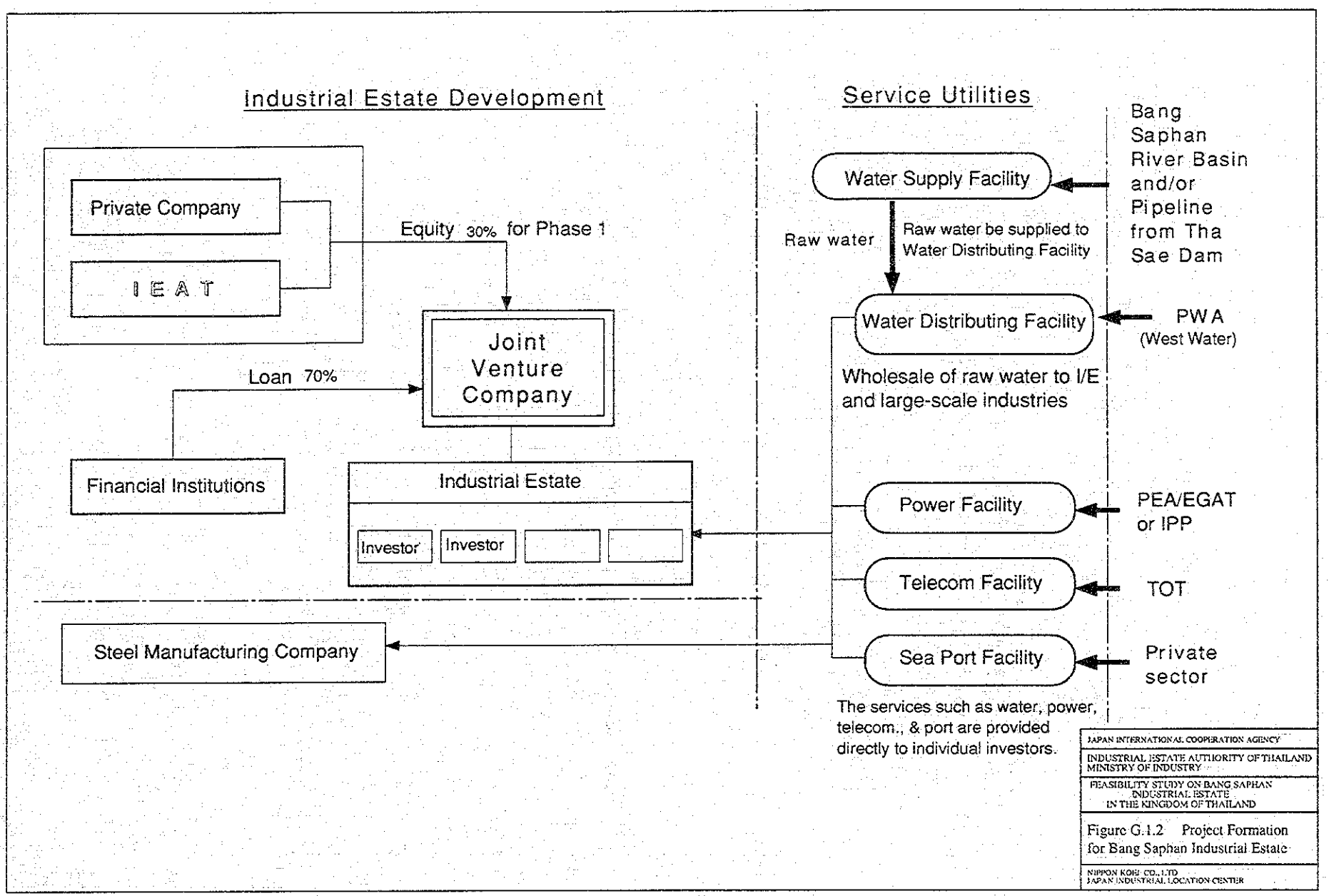
Industrial Estate Development
Service Utilities
Private Company
IEAT
Equity 30% for Phase 1
Joint Venture Company
Loan 70%
Financial Institutions
Industrial Estate
Investor
Investor
Steel Manufacturing Company
Water Supply Facility
Bang Saphan River Basin and/or Pipeline from Tha Sae Dam
Raw water
Raw water be supplied to Water Distributing Facility
Water Distributing Facility
PWA (West Water)
Wholesale of raw water to I/E and large-scale industries
Power Facility
PEA/EGAT or IPP
Telecom Facility
TOT
Sea Port Facility
Private sector
The services such as water, power, telecom., & port are provided directly to individual investors.
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Figure G.1.2 Project Formation for Bang Saphan Industrial Estate
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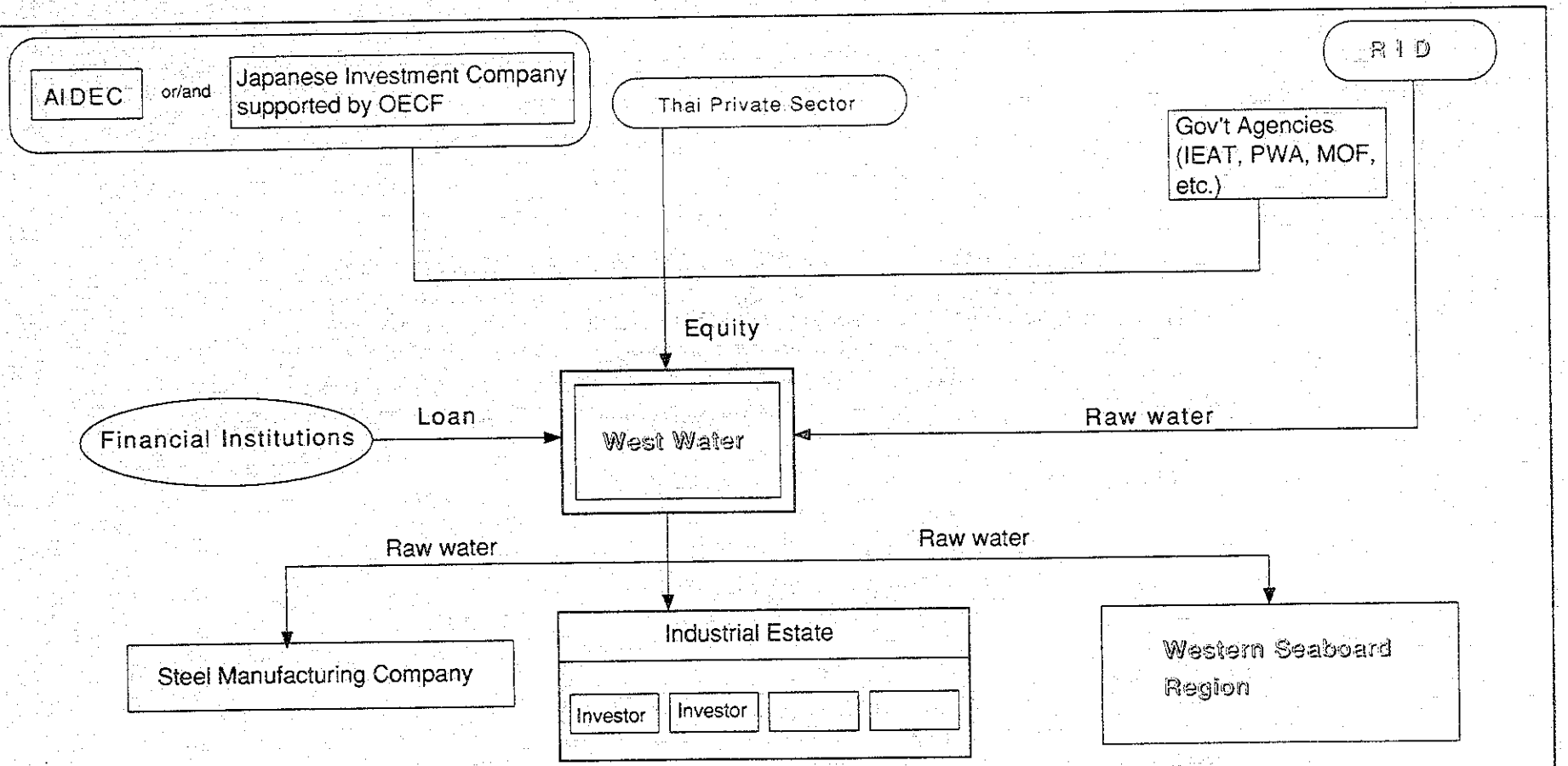

East Water : Eastern Water Resources Development and Management Co., Ltd.

West Water : Western Water Resources Development and Management Co., Ltd. (Provisional)

AIDEC : Asian Infrastructure Development Corporation

The objectives of this organization are to provide financial support in the form of debt or equity with the infrastructure utility entities in Asian countries. The authorized capital is 100 billion Yen, approximately 1 billion US$. The equity participants consist of ADB, OECF, major Japanese firms, etc.. The organization is financially supported as well in the form of loan by EXIM-J.

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INDUSTRIAL ESTATE AUTHORITY OF THAILAND
MINISTRY OF INDUSTRY

FEASIBILITY STUDY ON BANG SAPHAN INDUSTRIAL ESTATE IN THE KINGDOM OF THAILAND

Figure G.1.3 Water Supply Scheme in Bang Saphan I/E & Western Seaboard Region

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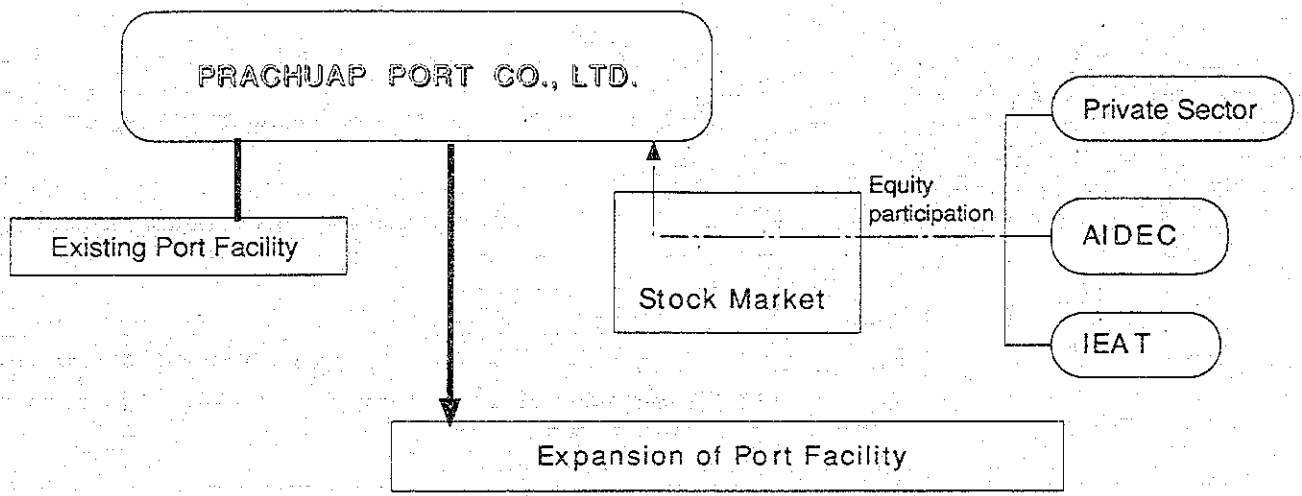

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MINISTRY OF INDUSTRY
FEASIBILITY STUDY ON BANG SAPHAN INDUSTRIAL ESTATE IN THE KINGDOM OF THAILAND

Figure G.1.4 Financial Scheme for Future Expansion of Port Facility for Bang Saphan Industrial Estate

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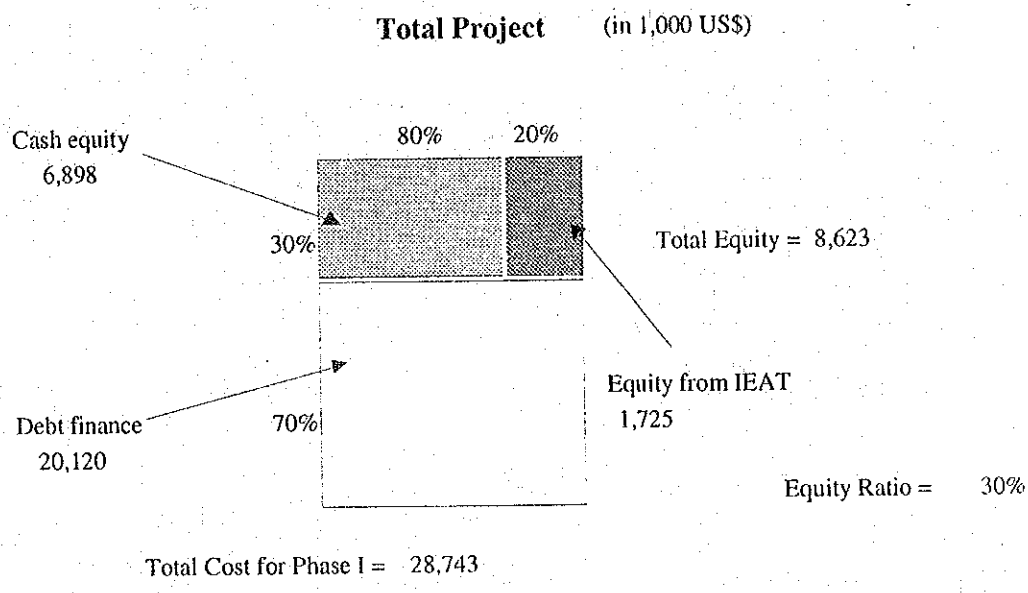

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FEASIBILITY STUDY ON BANG SAPHAN INDUSTRIAL ESTATE IN THE KINGDOM OF THAILAND
Figure G.2.1 Schematic Capital Structure for the Initial Stage
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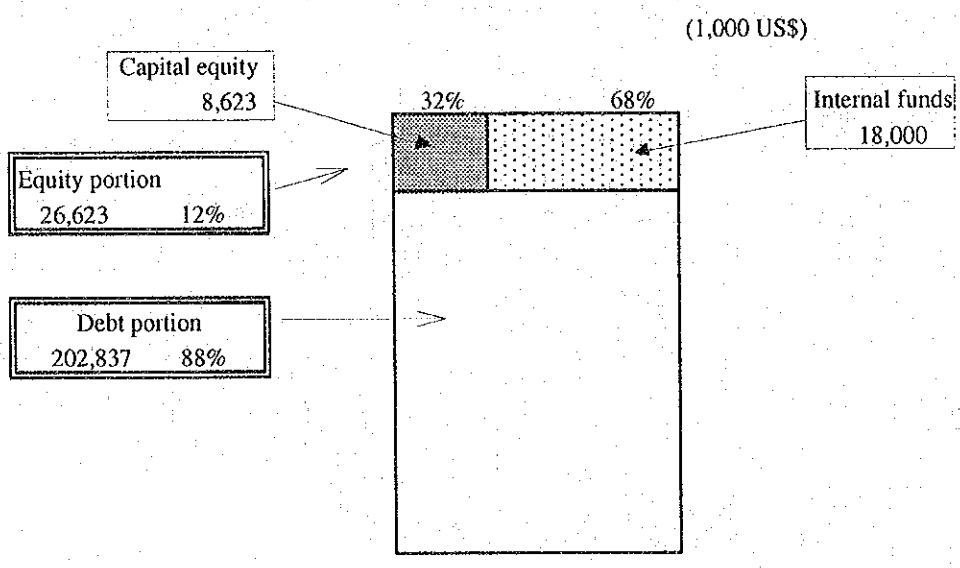

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FEASIBILITY STUDY ON BANG SAPHAN INDUSTRIAL ESTATE IN THE KINGDOM OF THAILAND
Figure G.2.2 Schematic Capital Structure for the Final Stage
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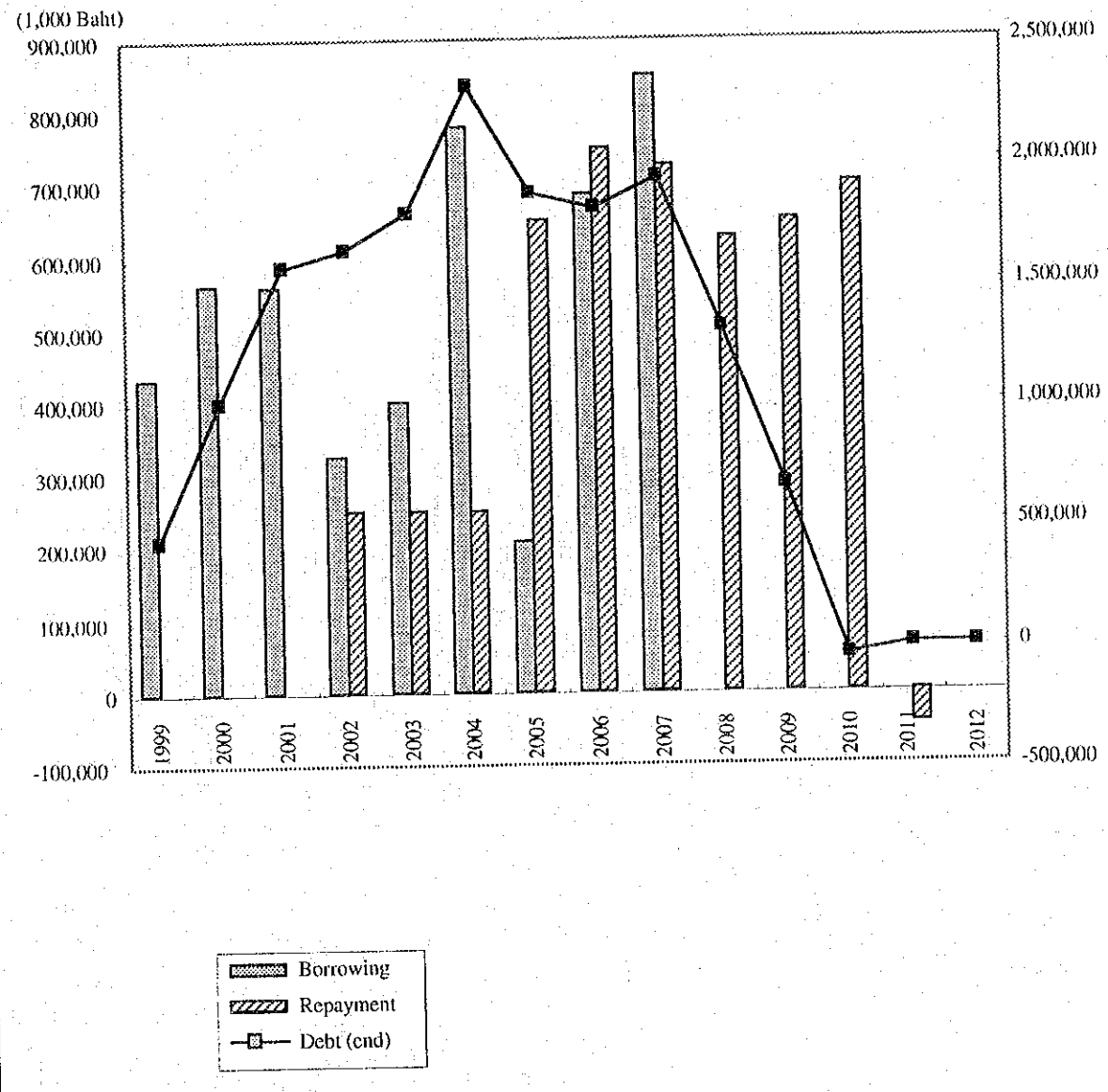

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INDUSTRIAL ESTATE AUTHORITY OF THAILAND MINISTRY OF INDUSTRY
FEASIBILITY STUDY ON BANG SAPHAN INDUSTRIAL ESTATE IN THE KINGDOM OF THAILAND
Figure G.2.3 Debt Service Management
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APPENDIX H COST ESTIMATE AND DEVELOPMENT SCHEDULE

CONTENTS

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APPENDIX H COST ESTIMATE AND DEVELOPMENT SCHEDULE

H.1 Condition of Construction Cost Estimate

Major conditions applied for the estimate of construction cost are summarized below :

(1) All the expenditures and revenues shall be made in baht.

(2) The construction cost will cover the preparation works, main works, engineering service cost, and physical contingencies.

(3) The cost of the main works will cover the expenses for labor, materials, construction equipment, and the contractor's indirect cost (including overhead expenses, profit, etc.).

- Labor cost is estimated on the basis of 8 (eight) working hours per day.
- Most of the construction materials are to be supplied from local markets. The imported material costs are estimated on the basis of C.I.F. (Cost, Insurance and Freight) price plus inland transportation cost.
- The foreign currency portion includes the cost of imported machinery and equipment, while the local component includes the cost of mechanics, labors, and machinery to be procured in Thailand.

(4) Prices are based on labor, materials and equipment prices as of June 1996. the exchange rate applied in the estimate is US dollar 1.0 = baht 25.0.

Additionally, it should be noted that the cost has been estimated on the basis of the following assumptions:

(a) Land acquisition: Land value is equivalent to US$ 10 /m^2 (400,000 baht/rai).

(b) Engineering service expense: The engineering service expense is estimated in proportion to the direct construction cost to cover the engineering works such as detailed design and construction supervision. The detailed design is estimated at about 7% of total direct construction cost and 5% is for the supervision work to be done by in-house consultants.

(c) Taxation: Import duty, etc. are exempted from the direct construction cost.

(d) Contingency: The physical contingency is estimated at 10% of the direct construction cost and engineering service expenses. The price contingency is estimated on the

basis of price escalation at a rate of 3% per annum for the foreign currency portion and 6% per annum for the local currency portion.

(e) The foreign currency portion is defined the cost of equipment, materials and services which are specially imported for the purpose of the project and the local currency portion is the cost of those which can be directly purchased in the domestic market.

H.2 Cost Estimate

The development cost of the Bang Saphan industrial estate is estimated at baht 2,770 million or US$ 111 million for the total area of 600 ha as shown below. Detailed development cost of the Bang Saphan industrial estate is tabulated in Table H.2.1 and the cost by development phase is shown in Tables H.2.2 ~ H.2.4.

Development Cost of Bang Saphan Industrial Estate (Internal Cost for 600 ha)

			Unit Cost /1	
	million baht	US$ million equivalent	1,000 baht/rai	US$/m^2
1. Construction Cost	2,250	90	870	22
2. Engineering Cost	270	11	100	3
3. Physical Contingency	250	10	100	2
4. Total	2,770	111	1,070	27

Note: /1 Per net factory area (total area is 414.5 ha including reserve factory area)
/2 Land acquisition cost for industrial estate site and price contingency are excluded.

In addition to the internal cost of the Bang Saphan industrial estate, the following overall external infrastructure cost will be necessary: baht 11.6 billion or US$ 464 million. Of the total project cost, an amount of baht 3.3 billion or US$ 132 million (approximately 30 % of total cost) is demarcated for the Bang Saphan industrial estate and remaining cost is allotted to the iron/steel industry, urban area, port, etc.

Development Cost of External Infrastructure

		Overall Cost		Demarcation to BSIE	
		(baht million)	(US$ million)	(baht million)	(US$ million)
I	Water supply facility	3,260	130.4	1,440	58
II	Road	1,170	46.8	890	36
III	Port	6,100	243.8	610	24
IV	Electric Facility	290	11.6	290	12
V	Telecommunication Facility	20	0.8	20	1
VI	Hazardous waste treatment	750	30.0	20	1
	Total	11,590	463.4	3,270	132

Note: Water supply facility: Pipeline between Tha Sae dam to BS, etc.
Road: Access road, interchange, etc.
Port: General cargo berth, bulk cargo berth
Electric Facility: Transmission line, etc.
Telecommunication Facility: Trunk line cable, etc.

Detailed external infrastructure cost is tabulated in H.2.5 and the cost by development phase is shown in Tables H.2.6 ~ H.2.8.

H.3 Development Schedule

The working conditions and the construction work schedule have been elaborated in the following manner:

(1) Working Conditions

The working conditions for the construction planning have been assumed as follows:

a) Workable days and hours: The estimate of numbers of workable days and hours bears a close relation to the weather, handling of materials, etc. As a result of a survey and study on such conditions, one work shift of eight (8) working hours per day has been applied, except for land grading work which will be done by 2 shifts a day.

b) Weather conditions: Working days are estimated by deducting Sundays, national holidays, and suspension days caused by bad weather.

c) Hourly production rate of the construction equipment: Hourly production rate of the major equipment is estimated on the basis of conventional construction methods and formulas considering the site conditions.

(2) Construction Work

a) Pre-construction program: The pre-construction activities consist of financial arrangements, selection of consultants, selection of contractors, and land acquisition. It is scheduled that the selection of consultants will be concluded within a period of one (1) month.

b) Mobilization: The mobilization and temporary works will be completed within two (2) months after the commencement of work.

c) Construction time schedule: The construction of the first phase development of the Bang Saphan industrial estate is proposed to be commenced at the beginning of 1999 and terminated by the end of 2000. The second and third phase development will follow when the previous development is finished.

The development schedule of the Bang Saphan industrial estate is planned in consideration of the construction conditions mentioned above and the implementing schedule of external infrastructure construction. It is summarized in Figure H.3.1.

The disbursement schedule of construction cost by internal and external infrastructure is tabulated in Tables H.3.1 and H.3.2.

Table H.2.1 Construction Cost of Bang Saphan Industrial Estate (Internal Cost, Overall Development)

	unit	Q'ty	Unit Cost (Baht)			Amount (Baht 1,000)			Remarks
			Foreign	Local	Total	Foreign	Local	Total	
1 Construction Cost of IE						567,138	1,679,921	2,247,059	
1) Land Grading						32,336	291,824	324,160	
a Clearing & grubbing	m2	5,516,000	1	9	10	5,516	49,644	55,160	
b Cut	m3	4,060,000	3	29	32	12,180	117,740	129,920	
c Filling	m3	3,650,000	4	34	38	14,640	124,440	139,080	
2) Road						38,739	219,521	258,260	
a Main road	m	12,290	1,950	11,050	13,000	23,966	135,805	159,770	4 lane with median
b Sub main road	m	4,680	1,800	10,200	12,000	8,424	47,736	56,160	4 lane with median
c Collector road	m	3,370	1,350	7,650	9,000	4,550	25,781	30,330	2 lane
d Others	m2	20,000	90	510	600	1,800	10,200	12,000	Square in front of railway station
3) Water Supply						187,896	326,399	514,295	
a Reservoir	LS	1	373,950	7,105,050	7,479,000	374	7,105	7,479	
b Pipeline	LS	1	9,122,400	51,693,600	60,816,000	9,122	51,694	60,816	
c Purification Plant	LS	1	178,400,000	267,600,000	446,000,000	178,400	267,600	446,000	
4) Sewerage						243,735	365,603	609,338	
a Pipework	LS	1	8,535,200	12,802,800	21,338,000	8,535	12,803	21,338	
b Sewage Treatment Plant	LS	1	235,200,000	352,800,000	588,000,000	235,200	352,800	588,000	
5) Drainage						8,848	72,678	81,526	
a Retention Pond	LS	1	2,085,000	11,815,000	13,900,000	2,085	11,815	13,900	
b Drainage Canal	LS	1	6,762,600	60,863,400	67,626,000	6,763	60,863	67,626	
6) Electric Facility	Ls	1	32,384,000	192,526,000	224,910,000	32,384	192,526	224,910	
7) Telecommunication Facility	LS	1	0	30,570,000	30,570,000	0	30,570	30,570	
8) Solid Waste Disposal Facility									
a Incinerator	Ls	1	2,000,000	8,000,000	10,000,000	2,000	8,000	10,000	Operation cost: 600 ~ 800 B/ton
9) Other relevant facility						21,200	172,800	194,000	
a Industrial estate center	m2	1,500	2,400	9,600	12,000	3,600	14,400	18,000	Triple story, per unit floor area
b Park	m2	190,000	80	720	800	15,200	136,800	152,000	
c Sodding, planting	m2	240,000	10	90	100	2,400	21,600	24,000	
2 Engineering Service Cost	LS					175,271	94,376	269,647	12 % of total construction cost
3 Subtotal						742,409	1,774,297	2,516,706	
4 Physical Contingency	LS					74,241	177,430	251,671	10 % of construction and engineering cost
5 Total						816,650	1,951,727	2,768,377	

Note: Price contingency is not inclusive.

Table H.2.2 Construction Cost of Bang Saphan Industrial Estate (Internal Cost, Phase 1)

	unit	Q'ty	Unit Cost (Baht)			Amount (Baht 1,000)			Remarks
			Foreign	Local	Total	Foreign	Local	Total	
1 Construction Cost of IE						117,073	380,324	497,397	
1) Land Grading						10,440	93,820	104,260	
a Clearing & grubbing	m2	1,200,000	1	9	10	1,200	10,800	12,000	
b Cut	m3	1,280,000	3	29	32	3,840	37,120	40,960	
c Filling	m3	1,350,000	4	34	38	5,400	45,900	51,300	
2) Road						5,955	33,745	39,700	
a Main road	m	2,500	1,950	11,050	13,000	4,875	27,625	32,500	4 lane with median
b Sub main road	m	600	1,800	10,200	12,000	1,080	6,120	7,200	4 lane with median
c Collector road	m	0	1,350	7,650	9,000	0	0	0	2 lane
d Others	m2	0	90	510	600	0	0	0	Square in front of railway station
3) Water Supply						47,118	94,052	141,170	
a Reservoir	LS	1	37,500	712,500	750,000	38	713	750	
b Pipeline	LS	1	5,452,500	30,897,500	36,350,000	5,453	30,898	36,350	
d Purification Plant	LS	1	41,628,000	62,442,000	104,070,000	41,628	62,442	104,070	
4) Sewerage						36,763	55,144	91,907	
a Pipework	LS	1	4,197,600	6,296,400	10,494,000	4,198	6,296	10,494	
b Sewage Treatment Plant	LS	1	32,565,200	48,847,800	81,413,000	32,565	48,848	81,413	
5) Drainage						3,393	23,587	26,980	
a Retention Pond	LS	1	2,085,000	11,815,000	13,900,000	2,085	11,815	13,900	
b Drainage Canal	LS	1	1,308,000	11,772,000	13,080,000	1,308	11,772	13,080	
								0	
6) Electric Facility	Ls	1	9,504,000	41,246,000	50,750,000	9,504	41,246	50,750	
7) Telecommunication Facility	LS	1	0	9,630,000	9,630,000	0	9,630	9,630	
8) Solid Waste Disposal Facility									
a Incinerator	Ls	0	2,000,000	8,000,000	10,000,000	0	0	0	Operation cost: 600 ~ 800 B/ton
9) Other relevant facility						3,900	29,100	33,000	
a Industrial estate center	m2	500	2,400	9,600	12,000	1,200	4,800	6,000	Triple story, per unit floor area
b Park	m2	30,000	80	720	800	2,400	21,600	24,000	
c Sodding, planting	m2	30,000	10	90	100	300	2,700	3,000	
2 Engineering Service Cost	LS					38,797	20,891	59,688	12 % of total construction cost
3 Subtotal						155,870	401,215	557,085	
4 Physical Contingency	LS					15,587	40,121	55,708	10 % of construction and engineering cost
5 Total						171,457	441,336	612,793	

Note: Price contingency is not inclusive.

Table H.2.3 Construction Cost of Bang Saphan Industrial Estate (Internal Cost, Phase 2)

	unit	Q'ty	Unit Cost (Baht)			Amount (Baht 1,000)			Remarks
			Foreign	Local	Total	Foreign	Local	Total	
1 Construction Cost of IE						188,681	532,246	720,927	
1) Land Grading						11,020	99,400	110,420	
a Clearing & grubbing	m2	1,800,000	1	9	10	1,800	16,200	18,000	
b Cut	m3	1,380,000	3	29	32	4,140	40,020	44,160	
c Filling	m3	1,270,000	4	34	38	5,080	43,180	48,260	
2) Road						15,518	87,933	103,450	
a Main road	m	4,840	1,950	11,050	13,000	9,438	53,482	62,920	4 lane with median
b Sub main road	m	1,050	1,800	10,200	12,000	1,890	10,710	12,600	4 lane with median
c Collector road	m	1,770	1,350	7,650	9,000	2,390	13,541	15,930	2 lane
d Others	m2	20,000	90	510	600	1,800	10,200	12,000	Square in front of railway station
3) Water Supply						62,590	96,510	159,100	
a Reservoir	LS	1	150,000	2,850,000	3,000,000	150	2,850	3,000	
b Pipeline	LS	1	0	0	0	0	0	0	
c Purification Plant	LS	1	62,440,000	93,660,000	156,100,000	62,440	93,660	156,100	
4) Sewerage						86,043	129,064	215,107	
a Pipework	LS	1	1,008,000	1,512,000	2,520,000	1,008	1,512	2,520	
b Sewage Treatment Plant	LS	1	85,034,800	127,552,200	212,587,000	85,035	127,552	212,587	
5) Drainage						1,723	15,507	17,230	
a Retention Pond	LS	1	0	0	0	0	0	0	
b Drainage Canal	LS	1	1,723,000	15,507,000	17,230,000	1,723	15,507	17,230	
6) Electric Facility	Ls	1	6,688,000	60,142,000	66,830,000	6,688	60,142	66,830	
7) Telecommunication Facility	LS	1	0	7,790,000	7,790,000	0	7,790	7,790	
8) Solid Waste Disposal Facility									
a Incinerator	Ls	1	2,000,000	8,000,000	10,000,000	2,000	8,000	10,000	Operation cost: 600 ~ 800 B/ton
9) Other relevant facility						3,100	27,900	31,000	
a Industrial estate center	m2	0	2,400	9,600	12,000	0	0	0	Triple story, per unit floor area
b Park	m2	30,000	80	720	800	2,400	21,600	24,000	
c Sodding, planting	m2	70,000	10	90	100	700	6,300	7,000	
2 Engineering Service Cost	LS					56,232	30,279	86,511	12 % of total construction cost
3 Subtotal						244,914	562,525	807,438	
4 Physical Contingency	LS					24,491	56,252	80,744	10 % of construction and engineering cost
5 Total						269,405	618,777	888,182	

Note: Price contingency is not inclusive.

Table H.2.4 Construction Cost of Bang Saphan Industrial Estate (Internal Cost, Phase 3)

	unit	Q'ty	Unit Cost (Baht)			Amount (Baht 1,000)			Remarks
			Foreign	Local	Total	Foreign	Local	Total	
1 Construction Cost of IE						261,384	767,351	1,028,735	
1) Land Grading						10,876	98,604	109,480	
a Clearing & grubbing	m2	2,516,000	1	9	10	2,516	22,644	25,160	
b Cut	m3	1,400,000	3	29	32	4,200	40,600	44,800	
c Filling	m3	1,040,000	4	34	38	4,160	35,360	39,520	
2) Road						17,267	97,844	115,110	
a Main road	m	4,950	1,950	11,050	13,000	9,653	54,698	64,350	4 lane with median
b Sub main road	m	3,030	1,800	10,200	12,000	5,454	30,906	36,360	4 lane with median
c Collector road	m	1,600	1,350	7,650	9,000	2,160	12,240	14,400	2 lane
d Others	m2	0	90	510	600	0	0	0	Square in front of railway station
3) Water Supply						78,188	135,837	214,025	
a Reservoir	LS	1	186,450	3,542,550	3,729,000	186	3,543	3,729	
b Pipeline	LS	1	3,669,900	20,796,100	24,466,000	3,670	20,796	24,466	
c Purification Plant	LS	1	74,332,000	111,498,000	185,830,000	74,332	111,498	185,830	
4) Sewerage						120,930	181,394	302,324	
a Pipework	LS	1	3,329,600	4,994,400	8,324,000	3,330	4,994	8,324	
b Sewage Treatment Plant	LS	1	117,600,000	176,400,000	294,000,000	117,600	176,400	294,000	
5) Drainage						3,732	33,584	37,316	
a Retention Pond	LS	1	0	0	0	0	0	0	
b Drainage Canal	LS	1	3,731,600	33,584,400	37,316,000	3,732	33,584	37,316	
6) Electric Facility	Ls	1	16,192,000	91,138,000	107,330,000	16,192	91,138	107,330	
7) Telecommunication Facility	LS	1	0	13,150,000	13,150,000	0	13,150	13,150	
8) Solid Waste Disposal Facility									
a Incinerator	Ls	0	2,000,000	8,000,000	10,000,000	0	0	0	Operation cost: 600 ~ 800 B/ton
9) Other relevant facility						14,200	115,800	130,000	
a Industrial estate center	m2	1,000	2,400	9,600	12,000	2,400	9,600	12,000	Triple story, per unit floor area
b Park	m2	130,000	80	720	800	10,400	93,600	104,000	
c Sodding, planting	m2	140,000	10	90	100	1,400	12,600	14,000	
2 Engineering Service Cost	LS					80,241	43,207	123,448	12 % of total construction cost
3 Subtotal						341,625	810,558	1,152,183	
4 Physical Contingency	LS					34,163	81,056	115,218	10 % of construction and engineering cost
5 Total						375,788	891,614	1,267,402	

Note: Price contingency is not inclusive.

Table H.2.5 Construction Cost of External Infrastructure for Bang Saphan Industrial Estate
(External Cost, Overall Development)

	unit	Q'ty	Unit Cost (Baht)	Total Cost (Baht 1,000)	Share for BSIE (%)	Cost for BSIE (Baht 1,000)	Remarks
1 Water Supply Facility				3,258,200		1,444,940	
1) Pipeline & pump (from BS river to BSIE, for 2001)				667,200		133,440	Water volume: 0.5m3/sec
a Pipeline	m	14,000	6,800	95,200	20	19,040	ϕ 600 mm
b Pump	LS	1	20,000,000	20,000	20	4,000	
c Reservoir	m3	4,600,000	120	552,000	20	110,400	Site reservoir
2) Pipeline & pump (from Tha Sae dam to BSIE, for 2006)				1,706,000		426,500	
a Pipeline & pump	m	144,000	11,500	1,656,000	25	414,000	ϕ 750 mm x 2 lines x 72 km
b Receiving well	LS	1	50,000,000	50,000	25	12,500	
Note: Dev cost of Tha Sae dam: 516.6 mB (dam) + 358.1 mB (compe)=874.7 mB							
3) Water Supply Facility for 2011				885,000		885,000	
(1) Bang Saphan river							
a Reservoirs	m3	20,000,000	30	600,000	100	600,000	
b Pipeline & pump	(from reservoir to BSIE, 20 MCM=0.6 m3/sec)						
Pipeline	m	26,000	10,000	260,000	100	260,000	
Pump	LS	1	25,000,000	25,000	100	25,000	
2 Road				1,167,600		892,600	
a Access road	km	16	25,000,000	400,000	75	300,000	
b Interchange	LS	1	700,000,000	700,000	75	525,000	
c Surrounding road	km	5.2	13,000,000	67,600	100	67,600	
3 Port				6,095,000		606,600	
1) General cargo berth				3,420,000		606,600	
a Phase 1	LS	1	2,016,000,000	2,016,000	10	201,600	
b Phase 2	LS	0	0	0		0	
c Phase 3	LS	1	1,404,000,000	1,404,000	29	405,000	
2) Bulk cargo berth				2,675,000		0	
a Phase 1	LS	0		0	0	0	
b Phase 2	LS	1	1,445,000,000	1,445,000	0	0	
c Phase 3	LS	1	1,230,000,000	1,230,000	0	0	
4 Electricity				287,000		287,000	
a Electric substation	MVA	200	1,000,000	200,000	100	200,000	
b 115 kV transmission line	km	29	3,000,000	87,000	100	87,000	
5 Telecommunication				16,800		16,800	
a Remote switching	LS	1	11,000,000	11,000	100	11,000	
b Transmission equipment	LS	1	1,300,000	1,300	100	1,300	
c Optical fiber cable	km	9	500,000	4,500	100	4,500	
6 Hazardous waste treatment	LS	1	750,000,000	750,000	3	22,500	
7 Total				11,574,600		3,270,440	

Note: /1 Land acquisition cost is not included.
/2 As of June 1996

Table H.2.6 Construction Cost of External Infrastructure for Bang Saphan Industrial Estate (External Cost, Phase 1)

	unit	Q'ty	Unit Cost (Baht)	Total Cost (Baht 1,000)	Share for BSIE (%)	Cost for BSIE (Baht 1,000)	Remarks
1 Water Supply Facility				667,200		133,440	
1) Pipeline & pump (from BS river to BSIE, for 2001)				667,200		133,440	Water volume: 0.5m3/sec
a Pipeline	m	14,000	6,800	95,200	20	19,040	ϕ 600 mm
b Pump	LS	1	20,000,000	20,000	20	4,000	
c Reservoir	m3	4,600,000	120	552,000	20	110,400	Site reservoir
2 Road				293,670		228,670	
a Access road	km	16	16,250,000	260,000	75	195,000	
c Surrounding road	km	2.6	13,000,000	33,670	100	33,670	
3 Port				2,016,000		201,600	
1) General cargo berth (Phase 1)				2,016,000	10	201,600	
a Main breakwater expansion	m	200	700,000	140,000			
b Expansion of 45,000 DWT berth	m	250	1,000,000	250,000			
c New construction of 20,000~40,000 DWT	m	1,000	800,000	800,000			
d Revetment	m	200	200,000	40,000			
e Dredging/reclamation	m3	2,500,000	100	250,000			
f Yard pavement	m2	200,000	1,000	200,000			
g Others(20%)	LS	1		336,000			
2) Bulk cargo berth				0	0	0	
4 Electricity				116,000		116,000	
a Electric substation	MVA	50	1,000,000	50,000	100	50,000	
b 115 kV transmission line	km	22	3,000,000	66,000	100	66,000	
5 Telecommunication				16,800		16,800	
a Remote switching	LS	1	11,000,000	11,000	100	11,000	
b Transmission equipment	LS	1	1,300,000	1,300	100	1,300	
c Optical fiber cable	km	9	500,000	4,500	100	4,500	
6 Hazardous waste treatment	LS	1	750,000,000	750,000	3	22,500	
7 Total				3,859,670		719,010	

Note: /1 Land acquisition cost is not included.

/2 As of June 1996

Table H.2.7 Construction Cost of External Infrastructure for Bang Saphan Industrial Estate (External Cost, Phase 2)

	unit	Q'ty	Unit Cost (Baht)	Total Cost (Baht 1,000)	Share for BSIE (%)	Cost for BSIE (Baht 1,000)	Remarks
1 Water Supply Facility				1,706,000		426,500	
1) Pipeline & pump (from Tha Sae dam to BSIE, for 2006)				1,706,000		426,500	
a Pipeline & pump	m	144,000	11,500	1,656,000	25	414,000	ϕ 750 mm x 2 lines x 72 km
b Receiving well	LS	1	50,000,000	50,000	25	12,500	
Note: Dev cost of Tha Sae dam: 516.6 mB (dam) + 358.1 mB (compe)=874.7 mB							
2 Road				33,930		33,930	
a Surrounding road	km	2.6	13,000,000	33,930	100	33,930	
3 Port				1,445,000		0	
1) General cargo berth				0		0	
2) Bulk cargo berth				1,445,000	0	0	
						0	
(Phase 2)							
a 140,000 DWT offshore berth	LS	1	520,000,000	520,000			
b 2,000 ton/hour unloader	set	2	215,000,000	430,000			
c 4,000 ton/hour	LS	1	75,000,000	75,000			
d 1.2km long trestle	LS	1	180,000,000	180,000			
e Contingency(20%)	LS	1	-	240,000			
4 Electricity				50,000		50,000	
a Electric substation	MVA	50	1,000,000	50,000	100	50,000	
b 115 kV transmission l	km	0	3,000,000	0	100	0	
5 Telecommunication				0		0	
6 Hazardous waste treatment				0		0	
7 Total				3,234,930		510,430	

Note: /1 Land acquisition cost is not included.

/2 As of June 1996

Table H.2.8 Construction Cost of External Infrastructure for Bang Saphan Industrial Estate (External Cost, Phase 3)

	unit	Q'ty	Unit Cost (Baht)	Total Cost (Baht 1,000)	Share for BSIE (%)	Cost for BSIE (Baht 1,000)	Remarks
1 Water Supply Facility				885,000		885,000	
1) Water Supply Facility for 2011				885,000		885,000	
(1) Bang Saphan river							
a Reservoirs	m3	20,000,000	30	600,000	100	600,000	
b Pipeline & pump	(from reservoir to BSIE, 20 MCM=0.6 m3/sec)						
Pipeline	m	26,000	10,000	260,000	100	260,000	
Pump	LS	1	25,000,000	25,000	100	25,000	
2 Road				840,000		630,000	
a Access road	km	16	8,750,000	140,000	75	105,000	
b Interchange	LS	1	700,000,000	700,000	75	525,000	
3 Port				2,634,000		405,000	
1) General cargo berth				1,404,000	29	405,000	
(Phase 3)							
a Main breakwater expansion	m	300	700,000	210,000			
b New construction of 50,000 DWT berth	m	400	1,000,000	400,000			
c Expansion of 45,000 DWT berth	m	300	1,000,000	300,000			
d Revetment	m	500	200,000	100,000			
e Dredging/reclamatio	m3	800,000	100	80,000			
f Yard pavement	m2	80,000	1,000	80,000			
g Others(20%)	LS	1	-	234,000			
2) Bulk cargo berth				1,230,000	0	0	
(Phase 2)							
a 140,000 DWT offshore berth	LS	1	520,000,000	520,000			
b 2,000 ton/hour unloader	set	2	215,000,000	430,000			
c 4,000 ton/hour	LS	1	75,000,000	75,000			
d Contingency(20%)	LS	1	-	205,000			
4 Electricity				121,000		121,000	
a Electric substation	MVA	100	1,000,000	100,000	100	100,000	
b 115 kV transmission l	km	7	3,000,000	21,000	100	21,000	
5 Telecommunication				0		0	
6 Hazardous waste treatment				0		0	
7 Total				4,480,000		2,041,000	

Note: /1 Land acquisition cost is not included.
/2 As of June 1996

Table H.3.1 Cost Disbursement of Bang Saphan Industrial Estate (Internal Cost)

(Unit: Baht 1,000)

	1997			1998			1999			2000			2001			2002			2003			2004			2005			2006			2007			Total		
	F/C	L/C	Total	F/C	L/C	Total	F/C	L/C	Total	F/C	L/C	Total	F/C	L/C	Total	F/C	L/C	Total	F/C	L/C	Total	F/C	L/C	Total	F/C	L/C	Total	F/C	L/C	Total	F/C	L/C	Total	F/C	L/C	Total
I Construction Cost																																		117,073	380,324	497,397
1 Phase 1							10,440	93,820	104,260	106,633	286,504	393,137																						188,681	532,246	720,927
2 Phase 2									0				11,020	99,400	110,420	88,831	216,423	305,254							10,876	98,604	109,480	125,253	334,374	459,627	125,253	334,374	459,627	261,382	767,551	1,028,733
3 Phase 3									0																									567,136	1,679,921	2,247,057
4 Total							10,440	93,820	104,260	106,633	286,504	393,137	11,020	99,400	110,420	88,831	216,423	305,254	88,831	216,423	305,254				10,876	98,604	109,480	125,253	334,374	459,627	125,253	334,374	459,627			
II Engineering Service Com																																		38,797	20,891	59,688
1 Phase 1	11,639	6,267	17,906	11,639	6,267	17,906	7,759	4,178	11,937	7,759	4,178	11,937																						56,232	30,279	86,511
2 Phase 2							16,870	9,084	25,954	16,870	9,084	25,954	7,310	3,936	11,246	7,310	3,936	11,246	7,873	4,239	12,112													80,241	43,207	123,448
3 Phase 3																			24,072	12,962	37,034	24,072	12,962	37,034	10,431	5,617	16,048	10,431	5,617	16,048	11,234	6,049	17,283	175,270	94,396	269,667
4 Total	11,639	6,267	17,906	11,639	6,267	17,906	24,629	13,262	37,891	24,629	13,262	37,891	7,310	3,936	11,246	7,310	3,936	11,246	31,945	17,201	49,146	24,072	12,962	37,034	10,431	5,617	16,048	10,431	5,617	16,048	11,234	6,049	17,283			
III Subtotal(I+II)																																		155,870	401,215	557,085
1 Phase 1	11,639	6,267	17,906	11,639	6,267	17,906	18,199	97,998	116,197	114,392	290,682	405,074	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	244,913	562,525	807,438
2 Phase 2	0	0	0	0	0	0	16,870	9,084	25,954	16,870	9,084	25,954	18,330	103,336	121,666	96,141	220,359	316,500	96,704	220,662	317,366	0	0	0	0	0	0	0	0	0	0	0	0	0	341,623	810,558	1,152,181
3 Phase 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24,072	12,962	37,034	24,072	12,962	37,034	21,307	104,221	125,528	135,684	339,991	475,675	136,487	340,423	476,910	742,406	1,774,297	2,516,704
4 Total	11,639	6,267	17,906	11,639	6,267	17,906	35,069	107,082	142,151	131,262	299,766	431,028	18,330	103,336	121,666	96,141	220,359	316,500	120,776	233,624	354,400	24,072	12,962	37,034	21,307	104,221	125,528	135,684	339,991	475,675	136,487	340,423	476,910			
IV Physical Contingency																																		15,587	40,121	55,708
1 Phase 1	1,164	627	1,791	1,164	627	1,791	1,820	9,800	11,620	11,439	29,068	40,507	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24,491	56,252	80,744
2 Phase 2	0	0	0	0	0	0	1,687	908	2,595	1,687	908	2,595	1,833	10,334	12,167	9,614	22,036	31,650	9,670	22,066	31,737	0	0	0	0	0	0	0	0	0	0	0	0	0	34,162	81,056	115,218
3 Phase 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,407	1,296	3,703	2,407	1,296	3,703	2,131	10,422	12,553	13,568	33,999	47,567	13,649	34,042	47,691	34,161	81,056	115,218
4 Total	1,164	627	1,791	1,164	627	1,791	3,507	10,708	14,215	13,126	29,977	43,103	1,833	10,334	12,167	9,614	22,036	31,650	12,078	23,362	35,440	2,407	1,296	3,703	2,131	10,422	12,553	13,568	33,999	47,567	13,649	34,042	47,691	74,241	177,430	251,670
V Subtotal(I+II+IV)																																		171,457	441,336	612,793
1 Phase 1	12,803	6,894	19,697	12,803	6,894	19,697	20,019	107,798	127,817	125,831	319,750	445,581	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	269,405	618,777	888,182
2 Phase 2	0	0	0	0	0	0	18,557	9,992	28,549	18,557	9,992	28,549	20,163	113,670	133,833	105,755	242,395	348,149	106,374	242,728	349,102	0	0	0	0	0	0	0	0	0	0	0	0	0	375,785	891,614	1,267,399
3 Phase 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26,479	14,258	40,737	26,479	14,258	40,737	23,438	114,643	138,081	149,252	373,990	523,242	150,136	374,465	524,600	816,647	1,951,727	2,768,374
4 Total	12,803	6,894	19,697	12,803	6,894	19,697	38,576	117,790	156,366	144,388	329,743	474,131	20,163	113,670	133,833	105,755	242,395	348,149	132,853	256,986	389,839	26,479	14,258	40,737	23,438	114,643	138,081	149,252	373,990	523,242	150,136	374,465	524,600			
VI Price Contingency																																		18,813	105,784	124,597
1 Phase 1	384	414	798	780	852	1,632	1,856	20,591	22,447	15,793	83,927	99,720	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	52,236	266,670	318,905
2 Phase 2	0	0	0	0	0	0	1,721	1,909	3,629	2,329	2,623	4,952	3,211	38,446	41,657	20,522	101,447	121,969	24,453	122,245	146,698	0	0	0	0	0	0	0	0	0	0	0	0	0	129,311	726,842	856,153
3 Phase 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6,087	7,181	13,268	7,064	8,467	15,531	7,143	79,044	86,187	51,330	295,769	347,099	57,687	336,381	394,068	200,360	1,099,295	1,299,656
4 Total	384	414	798	780	852	1,632	3,577	22,500	26,077	18,122	86,550	104,672	3,211	38,446	41,657	20,522	101,447	121,969	30,539	129,426	159,966	7,064	8,467	15,531	7,143	79,044	86,187	51,330	295,769	347,099	57,687	336,381	394,068			
VII Grand Total																																		190,269	547,119	737,390
1 Phase 1	13,187	7,307	20,494	13,583	7,746	21,328	21,875	128,389	150,264	141,624	403,677	545,301	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	921,640	885,447	1,207,087
2 Phase 2	0	0	0	0	0	0	20,278	11,901	32,179	20,886	12,615	33,501	23,374	152,116	175,490	126,276	343,842	470,118	130,826	364,973	495,800	0	0	0	0	0	0	0	0	0	0	0	0	0	505,097	1,618,456	2,123,553
3 Phase 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32,566	21,439	54,005	33,543	22,725	56,268	30,581	193,687	224,268	200,583	669,758	870,341	207,823	710,846	918,669	505,097	1,618,456	2,123,553
4 Total	13,187	7,307	20,494	13,583	7,746	21,328	42,153	140,290	182,443	162,510	416,292	578,803	23,374	152,116	175,490	126,276	343,842	470,118	163,392	386,413	549,805	33,543	22,725	56,268	30,581	193,687	224,268	200,583	669,758	870,341	207,823	710,846	918,669	1,017,007	3,051,022	4,068,030

Note: Price Contingency Foreign: 3.0 % per annum
Local: 6.0 % per annum

Table H.3.2 Development Cost Disbursement of External Infrastructure for Bang Saphan Industrial Estate

(Baht 1,000)

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total
1 Water Supply Facility			66,700	66,740	120,000	140,000	166,500			220,000	220,000	220,000	225,000			1,444,940
1) Pipeline & pump (from BS river to BSIE, for 2001)			66,700	66,740												133,440
2) Pipeline & pump (from Tha Sae dam to BSIE, for 2006)					120,000	140,000	166,500									426,500
3) Water Supply Facility for 2011										220,000	220,000	220,000	225,000			885,000
2 Road			108,700	120,000		11,200	22,700		105,000	262,500	262,500					892,600
a Access road			97,500	97,500						52,500	52,500					300,000
b Interchange									105,000	210,000	210,000					525,000
c Surrounding road			11,200	22,500		11,200	22,700									67,600
3 Port																
1) General cargo berth		40,000	80,000	81,600					81,000	161,000	163,000					606,600
2) Bulk cargo berth																0
4 Electricity			39,000	77,000	16,000	16,000	18,000		41,000	40,000	40,000					287,000
5 Telecommunication			8,400	8,400												16,800
6 Hazardous waste treatment				11,250	11,250											22,500
7 Total		40,000	302,800	364,990	147,250	167,200	207,200	0	227,000	683,500	685,500	220,000	225,000			3,270,440

Figure H.3.1 Implementing Schedule of Industrial Estate and External Infrastructure