

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

ROYAL IRRIGATION DEPARTMENT  
MINISTRY OF AGRICULTURE AND COOPERATIVES  
THE KINGDOM OF THAILAND

**THE STUDY  
ON  
THE KOK-ING-NAN WATER DIVERSION PROJECT  
IN  
THE KINGDOM OF THAILAND**

**SUPPORTING REPORT  
ON THE PROJECT COST ESTIMATION**

(Feasibility Study)

NOVEMBER 1999

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# Kok-Ing-Nan Water Diversion Project

## Feasibility Study Report

### Appendix: Feasibility Study of Construction Cost

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## 11.4 Project Cost Estimation

### 11.4.1 Summary of Project Cost

The whole Project cost is consisting of the costs for ① Kok-Ing-Nan Water Diversion Project, ② Associate Irrigation Project, ③ Environmental Impact Mitigation, ④ Existing Beneficial Area in Lower Nan and Delta and ⑤ New Beneficial Area in Lower Nan and summarized as follows;

And the cost is estimated by 35 Baht/U.S.\$., average of on 1998.

**Table 11.4.1 Summary of Project Cost**

(Unit Million Baht)

Items	A Plan			B Plan			Remark
	F.C	L.C	Total	F.C	L.C	Total	
(1) Kok-Ing-Nan Project	31,416	11,970	43,386	31,416	11,970	43,386	Refer to Table 11.4.1.(1)
(2) Associate Irrigation Project	2,500	1,313	3,813	2,500	1,313	3,813	Refer to Table 11.4.1.(2)
(3) Environmental Impact Mitigation	380	420	800	380	420	800	- do -
(4) Existing Beneficial Area in Lower Nan & Delta	-	944	944	-	944	944	- do -
(5) New Beneficial Area in Lower Nan	7,000	3,620	10,620	-	-	-	- do -
Total	41,296	18,267	59,563	34,296	14,647	48,943	

Remark; A plan includes the development of new beneficial area in the lower Nan (with new beneficial area), while B plan is without new beneficial area.

#### (1) Kok-Ing-Nan Project Cost

The Kok-Ing-Nan Project cost is summarized as follows;

**Table 11.4.1.(1) Summary of Kok-Ing-Nan Project Cost**

Items	Amount (Million Baht)			Remark
	F.C	L.C	Total	
(1) Construction Cost	24,987	7,232	32,219	
(2) Engineering Cost	1,539	1,565	3,104	
(3) Administration Cost	0	645	645	
(4) O/M Equipment	166	0	166	
(5) Total (1)~(4)	26,692	9,442	36,134	
(6) Total with Contingency (5) × 110%	29,361	10,386	39,747	
(7) Total with Tax (6) × 107%	31,416	11,113	42,529	
(8) Land Acquisition	0	857	857	
(9) Project Cost Total (7)+(8)	31,416	11,970	43,386	

#### (2) Other Costs related to the Kok-Ing-Nan Project

The other costs for Associate Irrigation, Environmental Impact Mitigation, Existing Beneficial Area and New Beneficial Area which are related to the Kok-Ing-Nan Project are estimated preliminary as shown in Table 11.4.1.(2)

**Table 11.4.1.(2) Other Costs related to Kok-Ing-Nan Project**

Remark	Unit	Quantity	Unit Price (Baht)			Amount (Million Baht)		
			F.C	L.C	Total	F.C	L.C	Total
<b>1. Associate Irrigation Project</b>								
(1) Irrigation System in New Area								
Kok-Ing Beneficial Area	Rai	200,000	10,000	5,000	15,000	2,000	1,000	3,000
Upper Nan Beneficial Area	Rai	50,000	10,000	5,000	15,000	500	250	750
Sub-total	Rai	250,000				2,500	1,250	3,750
(2) Land Consolidation for Perennial Crops								
Kok-Ing Beneficial Area	Rai	25,000		2,000	2,000		50	50
Upper Nan Beneficial Area	Rai	6,500		2,000	2,000		13	13
Sub-total	Rai	31,500					63	63
<b>Total</b>						2,500	1,313	3,813
<b>2. Environmental Impact Mitigation</b>								
(1) Reforestation Center	Place	3	-	-	-	90	60	150
(2) Diversified Crop Center	Place	3	-	-	-	30	30	60
(3) Eco-Tourism Area	Place	2	-	-	-	150	150	300
(4) Hatchery Facility	Place	4	-	-	-	50	50	100
(5) Animal Dispensary	Place	2	-	-	-	60	30	90
(6) Resettlement	L.S	-	-	-	-	-	100	100
<b>Total</b>						380	420	800
<b>3. Existing Beneficial Area in Lower Nan &amp; Delta</b>								
Land Consolidation in Delta	Rai	377,000	-	2,000	2,000	-	754	754
- do - in Lower Nan	Rai	95,000	-	2,000	2,000	-	190	190
<b>Total</b>	Rai	472,000					944	944
<b>4. New Beneficial Area in Lower Nan</b>								
New Irrigation System	Rai	700,000	10,000	5,000	15,000	7,000	3,500	10,500
Land Consolidation	Rai	60,000	-	2,000	2,000	-	120	120
<b>Total</b>	Rai	760,000				7,000	3,620	10,620

#### **11.4.2 Kok-Ing-Nan Project Cost**

##### **(1) Construction Cost**

The construction works will be carried out on the contract basis under the international tender because the construction is composed of the large scale, complicated and difficult works such as the diversion weir and canals to release the large discharge capacity of 175 cu.m/sec, tunnel with the large diameter of 11.0 m and long distance of more than 50 km and the dam with the large outlet discharge capacity of 200 cu.m/sec.

The construction works also will be carried out by the following 11 construction diversions taking into account the kinds of works, scale of works, construction cost, etc.

#### Kok-Ing Diversion Canal

- 1) Kok intake, Kok canal and Kok-Ing No.1 tunnel
- 2) Tak canal
- 3) Kok-Ing No.2 tunnel
- 4) Ing canal and Ing weir

#### Ing-Yot Diversion Canal and Tunnel

- 5) Ing-Yot canal including Ing-Yot No.1 tunnel
- 6) Ing-Yot culvert and Ing-Yot No.2 tunnel, Diversion 1
- 7) Ing-Yot No.2 tunnel, Diversion 2 and 3
- 8) Ing-Yot No.2 tunnel, Diversion 4 and 5
- 9) Ing-Yot No.2 tunnel, Diversion 6 and 7
- 10) Ing-Yot No.2 tunnel, Diversion 8 and 9

#### Yao River

- 11) Yao Dam and Yao River Training

#### (a) Estimation of Unit Rate for the Works

Although the unit rate for the works is estimated by Thai side study, it is very difficult to review it due to lack of back data for the cost estimation. JICA Team accordingly has studied the unit rate for the works preparing the basic rate for labor, construction materials and hiring cost of construction equipment for the works and comparing with the rate estimated by Thai side study.

The unit rate for tunnel construction is studied more carefully through classifying into tunnel types based on the geological conditions along the tunnel route, because the tunnel direct construction cost of about 22,000 million Baht in the Project will occupy as much as 70% of the total construction cost and give the large influence to the Project cost and economy. The unit rate also is divided into the foreign and local currency in order to judge the foreign and local currency portion of the construction cost.

**- Basic Rate**

The basis of applied basic rate is Thailand fiscal year 1998 Rates. The basic rate for labor , materials and construction equipment is shown in Table 11.4.2.(1)-1 ,Table 11.4.2.(1)-2 and Table 11.4.2.(1)-3.

As regards foreign and local currency portions for the major construction materials , the following rates are applied :

Materials	Foreign Currency (%)	Local Currency (%)
Labor	0	100
Cement	70	30
Reinforced bar	90	10
Fuel and Oil	50	50
Timber	0	100
Explosive	100	0
Steel Production	90	10
Construction Equipment	100	0

**Table 11.4.2.(1)-1 Basic Rate of Labor for Construction**

**Unit :Baht**

<b>Labor Rate ( L.C.)</b>				
<b>No.</b>	<b>Item</b>	<b>Unit</b>	<b>Basic Rate</b>	<b>Basic Rate for Tunnel</b>
1	Foreman Tunnel	day	0	720
2	Foreman	day	350	460
3	Skilled Labor	day	200	260
4	Common Labor	day	180	230
5	Operator of Heavy Equipment	day	350	460
6	Assistant of Operator	day	200	260
7	Driller	day	270	350
8	Driver	day	270	350
9	Steel Worker (Bender/Fixer)	day	270	350
10	Welder (Steel Pipe)	day	350	460
11	Form-work Labor (Carpenter)	day	300	390
12	Mechanics	day	300	390
13	Electrician	day	300	390
14	Concrete Worker	day	250	330
15	Mason (Stone Worker)	day	250	330

Table 11.4.2.(1)-2 Basic Rate of Material for Construction

Unit : Baht

Material Rate							
No.	Item	Unit	Basic Rate	Rate (%)		Basic Rate	
				F.C.	L.C.	F.C.	L.C.
1	Portland Cement Type I	ton	1,480	70	30	1,036	444
2	Portland Cement Type II	ton	2,380	70	30	1,666	714
3	Ready Mixed Concrete 350kg/cm2	m3	1,730	55	45	952	778
4	Ready Mixed Concrete 320kg/cm2	m3	1,660	55	45	913	747
5	Ready Mixed Concrete 210kg/cm2	m3	1,530	55	45	842	688
6	Ready Mixed Concrete 180kg/cm2	m3	1,420	55	45	781	639
7	Ready Mixed Concrete 135kg/cm2	m3	1,340	55	45	737	603
8	Concrete Admixture	liter	440	95	5	418	22
9	Mortar 1:3	m3	3,100	55	45	1,705	1,395
10	Fine Sand for Aggregate	m3	220	0	100	0	220
11	Coarse Sand for Aggregate(Gravel)	m3	220	0	100	0	220
12	Sand	m3	70	0	100	0	70
13	Stone for Riprap	m3	490	0	100	0	490
14	Cobblestone	m3	290	0	100	0	290
15	Crushed Aggregate for Road	ton	160	0	100	0	160
16	Clay (Laterite)	m3	40	0	100	0	40
17	Reinforce Bar <= D13	ton	15,320	90	10	13,788	1,532
18	Reinforced Bar D16-D25	ton	14,560	90	10	13,104	1,456
19	Timber	m3	9,800	0	100	0	9,800
20	Timber (Soft)	m3	8,200	0	100	0	8,200
21	Wood for Form	m2	160	0	100	0	160
22	P.C. Pile $\phi$ 600 *10 m	no.	12,400	10	90	1,240	11,160
23	P.C. Pile $\phi$ 500 *10 m	no.	9,000	10	90	900	8,100
24	P.C. Pile $\phi$ 300 *10 m	no.	3,900	10	90	390	3,510
25	S.P. Pile $\phi$ 450 *10 m (t=9mm)	no.	24,100	90	10	21,690	2,410
26	Steel Pipe D1000mm , t=8.7mm	m	10,400	90	10	9,360	1,040
27	H Beam	kg	24	90	10	22	2
28	Stainless Steel	kg	300	90	10	270	30
29	Steel Processing	kg	18	10	90	2	16
30	Prefabrication Steel Work	kg	18	20	80	4	14
31	Sheet Pile Type II	ton	18,000	90	10	16,200	1,800
32	Sheet Pile Type III	ton	30,000	90	10	27,000	3,000
33	Gasoline	little	12	50	50	6	6
34	Diesel Oil	little	10	50	50	5	5
35	Industrial Oil	little	5	50	50	3	2
36	Dynamite	kg	130	100	0	130	0
37	Detonator	P.C.	30	100	0	30	0
38	Electric Charge	kWh	3	0	100	0	3
39	Cross Bit RM 8-25	Pcs	3,500	100	0	3,500	0
40	Accelerator for Shotcrete	Kg	100	100	0	100	0
41	Rock Bolt 18t L=3m	Pcs	600	90	10	540	60
42	Rock Bolt 18t L=4m	Pcs	790	90	10	711	79
43	Rock Bolt 18t L=6m	Pcs	1,200	90	10	1,080	120
44	Square Washer 150 x 150 x 9	Pcs	116	90	10	104	12
45	Wire Mesh 150 x 150 x D6	m <sup>2</sup>	30	90	10	27	3
46	Nut M24	Pcs	10	90	10	9	1
47	H-Steel Tunnel Support	t	45,000	90	10	40,500	4,500
48	H-Steel Bending Extra H125~H200	t	1,610	90	10	1,449	161
49	H-Steel Rounding Extra	t	2,150	90	10	1,935	215
50	Joint Plate	t	6,030	90	10	5,427	603
51	Filter mat W300, t=20	m <sup>2</sup>	260	100	0	260	0
52	Waterproof Sheet for NATM 0.8mm	m <sup>2</sup>	660	100	0	660	0
53	Waterproof Sheet for NATM 1.0mm	m <sup>2</sup>	750	100	0	750	0
54	Concrete Pipe D150	m	400	10	90	40	360
55	Concrete Pipe D300, m/Hole L=2m	m	900	10	90	90	810
56	Drain Pit 200BK	Pcs	8,000	0	100	0	8,000
57	Dry Mortar	Kg	14	55	45	8	6

Table 11.4.2.(1)-3 Basic Rate of Construction Equipment & Operation Cost for Construction

Unit : Baht (1/3)

Construction Equipment ( F.C.)					Fuel Cost (l/Hr or l/7Hr/day)				Operation Cost of Construction Equipment								
No.	Item	Capital Cost (1,000 Baht)	Power (Kw)	Unit	Basic Rate (Baht)	Basic Rate or Tunnel (Baht/litre or Kw)	Oil or Power litre or Kw	Foreign Currency Basic Rate	Foreign Currency Cost(Baht)	Local Currency Basic Rate	Local Currency Cost(Baht)	F.C.	L.C.	Total Cost	F.C.	L.C.	Total Cost
1	Bulldozer 11t	2,290	78	Hr	980	1,080	11	5	55	5	55	1,035	55	1,090	1,135	55	1,190
2	Bulldozer 15t	3,040	100	Hr	1,300	1,430	14	5	70	5	70	1,370	70	1,440	1,500	70	1,570
3	Bulldozer 21t	5,020	152	Hr	2,160	2,380	21	5	105	5	105	2,265	105	2,370	2,485	105	2,590
4	Bulldozer 32t	7,330	208	Hr	3,150	3,470	29	5	145	5	145	3,295	145	3,440	3,615	145	3,760
5	Ripper Bulldozer 21t	5,530	130	Hr	1,110	1,220	18	5	90	5	90	1,200	90	1,290	1,310	90	1,400
6	Ripper Bulldozer 32t	8,310	170	Hr	1,660	1,830	24	5	120	5	120	1,780	120	1,900	1,950	120	2,070
7	Backhoe Shovel 0.35m3	1,730	60	Hr.	480	530	9	5	45	5	45	525	45	570	575	45	620
8	Backhoe Shovel 0.6 m3	3,040	104	Hr	830	910	15	5	75	5	75	905	75	980	985	75	1,060
9	Backhoe Shovel 1.2 m3	5,270	165	Hr	1,440	1,580	23	5	115	5	115	1,555	115	1,670	1,695	115	1,810
10	Backhoe Shovel 2.0 m3	10,360	270	Hr	2,820	3,100	38	5	190	5	190	3,010	190	3,200	3,290	190	3,480
11	Dragline 1.2m3	10,620	97	Hr	2,450	2,700	14	5	70	5	70	2,520	70	2,590	2,770	70	2,840
12	Wheel Loader 1.2m3	1,340	62	Hr	480	530	8	5	40	5	40	520	40	560	570	40	610
13	Wheel Loader 1.5m3	2,270	81	Hr	820	900	10	5	50	5	50	870	50	920	950	50	1,000
14	Wheel Loader 2.0m3	3,000	91	Hr	1,090	1,200	11	5	55	5	55	1,145	55	1,200	1,255	55	1,310
15	Tractor Shovel 2.3m3 wheel type	3,510	103	Hr.	1,270	1,400	12	5	60	5	60	1,330	60	1,390	1,460	60	1,520
16	Loader Crawler Type 1.2m3	1,880	68	Hr	690	760	10	5	50	5	50	740	50	790	810	50	860
17	Dump Truck 8t	1,600	179	Hr	410	450	8	5	40	5	40	450	40	490	490	40	530
18	Dump Truck 11t	2,100	246	Hr	530	580	10	5	50	5	50	580	50	630	630	50	680
19	Dump Truck 15t	3,220	153	Hr	740	810	10	5	50	5	50	790	50	840	860	50	910
20	Dump Truck 20t	5,400	218	Hr	1,250	1,380	14	5	70	5	70	1,320	70	1,390	1,450	70	1,520
21	Truck with Crane 4t x 2.9t lift	1,330	132	Hr.	360	400	5	5	25	5	25	385	25	410	425	25	450
22	Truck with Crane 15t	4,070	169	Hr	1,000	1,100	7	5	35	5	35	1,035	35	1,070	1,135	35	1,170
23	Truck with Crane 20t	6,580	165	Hr	1,600	1,760	7	5	35	5	35	1,635	35	1,670	1,795	35	1,830
24	Truck with Crane 35t	8,730	250	Hr	2,120	2,330	10	5	50	5	50	2,170	50	2,220	2,380	50	2,430
25	Truck 10t	2,220	233	Hr	710	780	10	5	50	5	50	760	50	810	830	50	880
26	Trailer 25t	3,470	235	Hr	970	1,070	14	5	70	5	70	1,040	70	1,110	1,140	70	1,210
27	Crawler Crane 20t	3,980	71	Hr	1,150	1,270	5	5	25	5	25	1,175	25	1,200	1,295	25	1,320

Table 11.4.2.(1)-3 Basic Rate of Construction Equipment & Operation Cost for Construction

Unit : Baht

(2/3)

Construction Equipment (F.C.)					Fuel Cost (0/Hr or 1/7Hr/day)				Operation Cost of Construction Equipment								
No.	Item	Capital Cost (1,000 Baht)	Power (PS,Kw)	Unit	Basic Rate (Baht)	Basic Rate or Tunnel (Baht)	Oil or Power litre or Kw	Foreign Currency Basic Rate	Local Currency Basic Rate	Cost(Baht)	F.C.	L.C.	Total Cost	Common Works (Baht/Hr or day)	F.C.	L.C.	Total Cost
28	Crawler Crane 50t	9,240	102	Hr	2,680	2,950	8	5	40	5	2,720	2,990	40	2,760	2,990	40	3,030
29	Crawler Crane 100t	22,090	193	Hr	6,400	7,040	14	5	70	5	6,470	7,110	70	6,540	7,110	70	7,180
30	Motor Grader Blade with 3.7m	3,160	115	Hr	1,220	1,340	10	5	50	5	1,270	1,390	50	1,320	1,390	50	1,440
31	Tamping Roller 13.5-20t	4,470	110	Hr	2,200	2,420	13	5	65	5	2,265	2,485	65	2,330	2,485	65	2,550
32	Tire Roller 20t	1,730	71	Hr	640	700	6	5	30	5	670	730	30	700	730	30	760
33	Road Roller 8-10t	1,960	26	Hr	670	740	3	5	15	5	685	755	15	700	755	15	770
34	Vibrating Roller 3 ~ 5t	1,010	20	Hr	500	550	3	5	15	5	515	565	15	530	565	15	580
35	Vibrating Roller 10 ~ 12t	3,160	97	Hr	1,550	1,710	12	5	60	5	1,610	1,770	60	1,670	1,770	60	1,830
36	Rock Breaker 800kg	3,680	104	Hr	2,160	2,380	15	5	75	5	2,235	2,455	75	2,310	2,455	75	2,530
37	Rock Breaker 1300kg	4,090	104	Hr	3,520	3,870	15	5	75	5	3,595	3,945	75	3,670	3,945	75	4,020
38	Crawler Drill 150kg	5,560	30	Hr	2,720	2,990	5	5	25	5	2,745	3,015	25	2,770	3,015	25	3,040
39	Compressor 15.0m3/min	1,300	107	day	1,730	1,900	117	5	585	5	2,315	2,900	585	2,900	2,485	585	3,070
40	Water Tank Lorry 3.8 m3	1,030	118	Hr	300	330	4	5	20	5	320	350	20	340	350	20	370
41	Water Tank Lorry 5.0 m3	1,360	132	Hr	400	440	4	5	20	5	420	460	20	440	460	20	480
42	Agitator Car (Truck Mixer) 1.7 m3	920	138	Hr	220	240	9	5	45	5	265	285	45	310	285	45	330
43	Agitator Car (Truck Mixer) 3.2 m3	1,340	162	Hr	340	370	11	5	55	5	395	425	55	450	425	55	480
44	Agitator Car (Truck Mixer) 4.5 m3	2,040	213	Hr	500	550	14	5	70	5	570	620	70	640	620	70	690
45	Agitator Car 5 m3 (without Truck)	2,470	22	Hr	1,060	1,170	2	5	10	5	1,070	1,180	10	1,080	1,180	10	1,190
46	Concrete Mixer 0.5m3	500	4.8	Hr	1,400	1,540	1	5	5	5	1,405	1,545	5	1,410	1,545	5	1,550
47	Concrete Plant 1.0*2 m3 (25-30m3/h)	6,890	56	Hr	1,760	1,940	4	5	20	5	1,780	1,960	20	1,800	1,960	20	1,980
48	Concrete Plant 0.75*3 m3 (45m3/h)	11,070	75	Hr	2,840	3,120	5	5	25	5	2,865	3,145	25	2,890	3,145	25	3,170
49	Concrete Pump 30m3/h	3,180	103	Hr	750	830	7	5	35	5	785	865	35	820	865	35	900
50	Concrete Pum Pipe 90-100m3/hr.	5,070	141	Hr	1,600	1,760	9	5	45	5	1,645	1,805	45	1,690	1,805	45	1,850
51	Concrete Pum Boom 90-110 m3/hr.	7,310	199	Hr	1,730	1,900	13	5	65	5	1,795	1,965	65	1,860	1,965	65	2,030
52	Pile Driver for 500-600mm 3.5t	2,290	107	day	4,650	5,120	48	5	240	5	4,890	5,360	240	5,130	5,360	240	5,600
53	Vibratory Hammer 30kw (141Kw)	10,160	141	day	11,610	12,770	302	0	0	3	11,610	12,770	906	12,516	12,770	906	13,676
54	Vibratory Compactor 100kg (gasolin	52	4	day	130	140	7	6	42	6	172	182	42	214	182	42	224



Table 11.4.2.(1)-3 Basic Rate of Construction Equipment & Operation Cost for Construction

Unit : Baht (3/3)

Construction Equipment ( F.C.)					Fuel Cost (l/Hr or 1/7Hr/day)				Operation Cost of Construction Equipment									
No.	Item	Capital Cost (1,000 Baht)	Power (PS,Kw)	Unit	Basic Rate (Baht)	Basic Rate per Tunnel (Baht)	Oil or Power litre or Kw	Foreign Currency Basic Rate	Local Currency Cost(Baht)	Common Works (Baht/(Hr or day))	F.C.	L.C.	Total Cost	Tunnel Works (Baht/(Hr or day))	F.C.	L.C.	Total Cost	
55	Sand Pump $\phi$ 100 H=10m (gasoline)	46	5.5	day	110	120	15	6	90	6	90	200	210	90	290	210	90	300
56	Sand Pump $\phi$ 100 H=25m (gasoline)	91	11	day	220	240	29	6	174	6	174	394	414	174	568	414	174	588
57	Blower 65m3 1.1kg/cm2	4,360	150	day	4,570	5,030	123	5	615	5	615	5,185	5,645	615	5,800	5,645	615	6,260
58	Diesel Generator 45KVA	440	41.9	day	710	780	38	5	190	5	190	900	970	190	1,090	970	190	1,160
59	Diesel Generator 75KVA	690	68.8	day	1,110	1,220	62	5	310	5	310	1,420	1,530	310	1,730	1,530	310	1,840
60	Soft Rock Tunnel Cutter 200kw	24,220	224	Hr	0	8,450	31	5	155	5	155	0	0	0	0	8,605	155	8,760
61	Jumbo Drill, Crawler 2Booms, 150K	16,180	51	Hr	0	7,200	7	5	35	5	35	0	0	0	0	7,235	35	7,270
62	Shotcrete Shooter (Wet 10-15m3/hr)	4,310	30	Hr	0	3,080	5	5	25	5	25	0	0	0	0	3,105	25	3,130
63	Shotcrete Robot Shot Radius 8m	2,580	11	Hr	0	2,160	2	5	10	5	10	0	0	0	0	2,170	10	2,180
64	Dust Collector 300m3/hr, 30kw	1,750	30	Hr	0	1,290	21	0	0	3	63	0	0	0	0	1,290	63	1,353
65	Accelerator Supplier 5.5kw	730	5.5	day	0	1,130	18	0	0	3	54	0	0	0	0	1,130	54	1,184
66	Grout Mixer 100liter Type	60	2	day	80	110	3	5	15	5	15	95	125	15	110	125	15	140
67	Grout Pump Single, 15-30liter/min	140	2.4	day	220	280	3	5	15	5	15	235	295	15	250	295	15	310
68	Vibrator Converter 60mm	40	1.1	day	70	90	3	6	18	6	18	88	108	18	106	108	18	126

**(b) Estimation of Construction Cost**

The construction cost for the Project is estimated based on the Bill of Quantity for 11 construction diversions as shown in the supporting report and summarized in Table 11.4.2.(1)-4.

The total construction cost of the Project is 32,219 million Baht consisting of the foreign currency of 24,987 million Baht and the local currency of 7,232 million Baht.

Table 11.4.2.(1)-4 Construction Cost

(1,000Baht)					
Item	Unit	Project Cost × 1,000Baht			Remarks
		F.C.	L.C.	Total	
B,Q-1 Construction Cost of Kok Intake, Kok Canal & Kok-Ing No.1 Tunnel					
(1) Kok Intake	L.S.	219,445	99,265	318,710	
(2) Kok Open Canal	L.S.	390,282	179,577	569,859	
(3) Kok-Ing No.1 Tunnel	L.S.	827,178	234,790	1,061,968	
(4) Main O/M Office	L.S.	205,590	82,583	288,173	
Sub-Total ("(1)" + "(4)")		1,642,000	596,000	2,238,000	× 1,000Baht
B,Q-2 Construction Cost of Tak Canal					
(1) Tak Open Canal	L.S.	215,212	78,749	293,961	
(2) Tak Culvert Canal	L.S.	1,412,302	344,944	1,757,246	
Sub-Total ("(1)" + "(2)")		1,628,000	424,000	2,052,000	× 1,000Baht
B,Q-3 Construction Cost of Kok-Ing No.2 Tunnel					
(1) Kok-Ing No.2 Tunnel	L.S.	1,414,000	388,000	1,802,000	
Sub-Total		1,414,000	388,000	1,802,000	× 1,000Baht
B,Q-4 Construction Cost of Ing Canal & Ing Weir/Intake					
(1) Ing Open Canal	L.S.	623,834	242,894	866,728	
(2) Ing Culvert Canal	L.S.	246,877	67,967	314,844	
(3) Ing Weir	L.S.	273,904	79,767	353,671	
(4) Ing Intake	L.S.	277,992	121,150	399,142	
Sub-Total ("(1)" + "(4)")		1,423,000	512,000	1,935,000	× 1,000Baht
B,Q-5 Construction Cost of Ing-Yot Canal & Ing-Yot No.1 Tunnel					
(1) Ing-Yot Open Canal	L.S.	65,564	15,921	81,485	
(2) Ing-Yot Culvert Canal (1)	L.S.	1,434,946	342,254	1,777,200	
(3) Ing-Yot No.1 Tunnel	L.S.	594,877	163,114	757,991	
Sub-Total ("(1)" + "(3)")		2,095,000	521,000	2,616,000	× 1,000Baht
B,Q-6 Construction Cost of Ing-Yot Culvert & Ing-Yot No.2 Tunnel Div.1					
(1) Ing-Yot Culvert Canal (2)	L.S.	1,434,946	342,254	1,777,200	
(2) Ing-Yot No.2 Tunnel Division 1	L.S.	1,270,858	358,392	1,629,250	
Sub-Total ("(1)" + "(2)")		2,706,000	701,000	3,407,000	× 1,000Baht
B,Q-7 Construction Cost of Ing-Yot No.2 Tunnel Div.2 & Div.3					
(1) Ing-Yot No.2 Tunnel Division 2	L.S.	1,389,592	393,885	1,783,477	
(2) Ing-Yot No.2 Tunnel Division 3	L.S.	1,599,635	438,305	2,037,940	
Sub-Total ("(1)" + "(2)")		2,989,000	832,000	3,821,000	× 1,000Baht
B,Q-8 Construction Cost of Ing-Yot No.2 Tunnel Div.4 & Div.5					
(1) Ing-Yot No.2 Tunnel Division 4	L.S.	1,940,864	503,636	2,444,500	
(2) Ing-Yot No.2 Tunnel Division 5	L.S.	1,801,914	465,103	2,267,017	
Sub-Total ("(1)" + "(2)")		3,743,000	969,000	4,712,000	× 1,000Baht
B,Q-9 Construction Cost of Ing-Yot No.2 Tunnel Div.6 & Div.7					
(1) Ing-Yot No.2 Tunnel Division 6	L.S.	1,837,916	481,022	2,318,938	
(2) Ing-Yot No.2 Tunnel Division 7	L.S.	1,704,036	441,895	2,145,931	
Sub-Total ("(1)" + "(2)")		3,542,000	923,000	4,465,000	× 1,000Baht
B,Q-10 Construction Cost of Ing-Yot No.2 Tunnel Div.8 & Div.9					
(1) Ing-Yot No.2 Tunnel Division 8	L.S.	1,357,340	377,450	1,734,790	
(2) Ing-Yot No.2 Tunnel Division 9	L.S.	1,272,688	359,035	1,631,723	
Sub-Total ("(1)" + "(2)")		2,630,000	736,000	3,366,000	× 1,000Baht
B,Q-11 Construction Cost of Yao Dam & Yot and Yao River Training					
(1) River Diversion Works	L.S.	72,574	35,001	107,575	
(2) Intake Works	L.S.	91,716	41,281	132,997	
(3) Outlet Works	L.S.	67,179	27,584	94,763	
(4) Coffor Dam	L.S.	26,029	15,202	41,231	
(5) Main Dam	L.S.	126,737	44,219	170,956	
(6) Spillway	L.S.	378,078	125,898	503,976	
(7) Control House Yard	L.S.	30,324	16,367	46,691	
(8) Yot River Training	L.S.	90,307	17,516	107,823	
(9) Flood Protection Dike	L.S.	96,247	31,030	127,277	
(10) River Improvement	L.S.	195,603	276,177	471,780	
Sub-Total ("(1)" + "(10)")		1,175,000	630,000	1,805,000	× 1,000Baht
Total ("B,Q-1" + ... + "B,Q-11")		24,987,000	7,232,000	32,219,000	without Tax

Table B,Q-1 Construction Cost of Kok Intake, Kok Canal &amp; Kok-Ing No.1 Tunnel

(1/2)

Item	Unit	Quantity	Rate		Cost × 1,000 Baht			Remarks
			F.C.	L.C.	F.C.	L.C.	Total	
<b>1 Kok Intake</b>								
1-1 Temporary Works	%	*1-2 (16)*5%	5%	5%	9,500	4,297	13,797	
1-2 Direct Construction Cost								
(1) Site Clearing	ha	13	-	34,400	-	447	447	
(2) Stripping	m <sup>3</sup>	65,000	53	6	3,445	390	3,835	
(3) Excavation, Common	m <sup>3</sup>	500,000	61	7	30,500	3,500	34,000	
(4) Fill & Backfill	m <sup>3</sup>	173,000	48	6	8,304	1,038	9,342	
(5) Concrete Pile φ 600	m	4,500	174	1,566	783	7,047	7,830	
(6) Steel Sheet Pile	m <sup>2</sup>	1,700	4,050	450	6,885	765	7,650	
(7) Plain Concrete at Canal Slope	m <sup>3</sup>	36,000	1,370	666	49,320	23,976	73,296	
(8) Structure Concrete	m <sup>3</sup>	18,000	1,529	972	27,522	17,496	45,018	
(9) Form work	m <sup>2</sup>	11,000	104	401	1,144	4,411	5,555	
(10) Reinforced Bar	ton	1,500	20,691	2,739	31,037	4,109	35,146	
(11) Intake Gate	ton	139	90,000	60,000	12,510	8,340	20,850	
(12) Trash Rack	ton	221	18,000	12,000	3,978	2,652	6,630	
(13) Stoplog	ton	92	60,000	40,000	5,520	3,680	9,200	
(14) Control house	m <sup>2</sup>	500	-	8,000	-	4,000	4,000	
(15) Miscellaneous	%	5			9,047	4,093	13,140	
(16) Subtotal ("(1)"+"(15)")					189,995	85,944	275,939	
1-3 Subtotal ("1-1"+"1-2")					199,495	90,241	289,736	
1-4 Overhead Cost ("1-3"×10%)	%		10%	10%	19,950	9,024	28,974	
1-5 Subtotal ("1-3"+"1-4")					219,445	99,265	318,710	
<b>2 Kok Open Canal</b>								
2-1 Temporary Works	%	*2-2 (18)*5%	5%	5%	16,895	7,774	24,669	
2-2 Direct Construction Cost								
(1) Site Clearing	ha	120	0	34,400	0	4,128	4,128	
(2) Stripping	m <sup>3</sup>	193,000	53	6	10,229	1,158	11,387	
(3) Excavation, Common	m <sup>3</sup>	1,916,000	61	7	116,876	13,412	130,288	
(4) Fill & Backfill	m <sup>3</sup>	274,000	48	6	13,152	1,644	14,796	
(5) Laterite Paving	m <sup>3</sup>	17,900	22	198	394	3,544	3,938	
(6) Lining Concrete	m <sup>3</sup>	53,260	1,370	666	72,966	35,471	108,437	
(7) Structure Concrete	m <sup>3</sup>	15,980	1,529	972	24,433	15,533	39,966	
(8) Form work	m <sup>2</sup>	16,880	104	401	1,756	6,769	8,525	
(9) Reinforced Bar	ton	1,780	20,691	2,739	36,830	4,875	41,705	
(10) Overchute	No.	29	L.S.	L.S.	4,000	9,000	13,000	
(11) Highway Bridge	No.	3	L.S.	L.S.	16,000	7,000	23,000	
(12) Roadway Bridge	No.	7	L.S.	L.S.	7,000	17,000	24,000	
(13) Farm & O/M Roadway Bridge	No.	14	L.S.	L.S.	10,000	23,000	33,000	
(14) Drainage Culvert	No.	1	L.S.	L.S.	1,000	2,000	3,000	
(15) Check Structure (Gate)	No.	1	L.S.	L.S.	7,000	3,000	10,000	
(16) Turn-out	No.	6	30,000	90,000	180	540	720	
(17) Miscellaneous	%	5			16,091	7,404	23,495	
(18) Subtotal ("(1)"+"(17)")					337,907	155,478	493,385	
2-3 Subtotal ("2-1"+"2-2")					354,802	163,252	518,054	
2-4 Overhead Cost ("2-3"×10%)	%		10%	10%	35,480	16,325	51,805	
2-5 Subtotal ("2-3"+"2-4")					390,282	179,577	569,859	

Table B,Q-1 Construction Cost of Kok Intake, Kok Canal &amp; Kok-Ing No.1 Tunnel

(2/2)

Item	Unit	Quantity	Rate		Cost × 1,000Baht			Remarks
			F.C.	L.C.	F.C.	L.C.	Total	
<b>3 Kok-Ing No.1 Tunnel</b>								
3-1 Common Temporary Works	L.S.	*3-2 (7)*5%	5%	5%	32,671	6,949	39,620	
3-2 Direct Construction Cost								
(1) Excavation	m	3,046.99	L.S.	L.S.	129,875	12,402	142,277	
(2) Shotcrete	m	3,046.99	L.S.	L.S.	97,556	19,201	116,757	
(3) Rock Bolts	m	3,046.99	L.S.	L.S.	119,164	33,468	152,632	
(4) Steel Support	m	3,046.99	L.S.	L.S.	166,483	18,121	184,604	
(5) Concrete Lining	m	3,046.99	L.S.	L.S.	139,432	51,543	190,975	
(6) Drain Pipe	m	3,046.99	L.S.	L.S.	900	4,250	5,150	
(7) Subtotal ("(1)" + ... + "(6)")					653,410	138,985	792,395	
3-3 Subtotal ("3-1" + "3-2")					686,081	145,934	832,015	
3-4 Temporary Works								
(1) Temporary Works of Inside Tunnel			L.S.	L.S.	12,346	58,885	71,231	
(2) Temporary Works of Outside Tunnel			L.S.	L.S.	53,553	8,626	62,179	
(3) Subtotal ("(1)" + "(2)")					65,899	67,511	133,410	
3-5 Subtotal ("3-3" + "3-4")					751,980	213,445	965,425	
3-6 Overhead Cost ("3-5"×10%)	%		10%	10%	75,198	21,345	96,543	
3-7 Subtotal ("3-5" + "3-6")					827,178	234,790	1,061,968	
<b>4 Main O/M Office</b>								
4-1 Common Temporary Works	L.S.	*4-2 (7)*5%	5%	5%	8,900	3,575	12,475	
4-2 Direct Construction Cost								
(1) Main Office	m2	2,000	0	8,000	0	16,000	16,000	150m×20m
(2) Residential Quarters (150m×20m)	m2	3,000	0	12,000	0	36,000	36,000	
(3) Repair Shop	m2	1,000	0	5,000	0	5,000	5,000	
(4) Store Shop	m2	2,000	0	5,000	0	10,000	10,000	
(5) Motor Pool	m2	3,000	0	1,500	0	4,500	4,500	
(6) Others (Control System Equipment)	L.S.	-	L.S.	0	178,000	0	178,000	
(7) Subtotal ("(1)" + ... + "(6)")					178,000	71,500	249,500	
4-3 Subtotal ("4-1" + "4-2")					186,900	75,075	261,975	
4-4 Overhead Cost ("4-3"×10%)	%		10%	10%	18,690	7,508	26,198	
4-5 Subtotal ("4-3" + "4-4")					205,590	82,583	288,173	
<b>5 Sub-Total ("1" + ... + "4")</b>					1,642,000	596,000	2,238,000	
<b>6 Taxes ("5"×7%)</b>	7%		7%	7%	115,000	42,000	157,000	
<b>7 Total Cost ("5" + "6")</b>					1,757,000	638,000	2,395,000	× 1,000Baht

Table B,Q-2 Construction Cost of Tak Canal

(1/1)

Item	Unit	Quantity	Rate		Cost × 1,000Baht			Remarks
			F.C.	L.C.	F.C.	L.C.	Total	
<b>1 Tak Open Canal</b>								
1-1 Temporary Works	%	"1-2 (14)"×5%	5%	5%	9,317	3,409	12,726	
1-2 Direct Construction Cost								
(1) Site Clearing	ha	70	0	34,400	0	2,408	2,408	
(2) Stripping	m <sup>3</sup>	119,000	53	6	6,307	714	7,021	
(3) Excavation, Common	m <sup>3</sup>	1,581,000	61	7	96,441	11,067	107,508	
(4) Fill & Backfill	m <sup>3</sup>	155,000	48	6	7,440	930	8,370	
(5) Laterite Paving	m <sup>3</sup>	8,700	22	198	191	1,723	1,914	
(6) Lining Concrete	m <sup>3</sup>	31,400	1,370	666	43,018	20,912	63,930	
(7) Overchute	No.	5	L.S.	L.S.	1,000	2,000	3,000	
(8) Highway Bridge	No.	1	L.S.	L.S.	8,000	4,000	12,000	
(9) Road way Bridge	No.	2	L.S.	L.S.	3,000	6,000	9,000	
(10) Farm Roadway Bridge	No.	6	L.S.	L.S.	5,000	12,000	17,000	
(11) Check Structure (Gate)	No.	1	L.S.	L.S.	7,000	3,000	10,000	
(12) Turn-out	No.	2	30,000	90,000	60	180	240	
(13) Miscellaneous	%	5			8,873	3,247	12,120	
(14) Subtotal ("(1)"+"(13)")					186,330	68,181	254,511	
1-3 Subtotal ("1-1"+"1-2")					195,647	71,590	267,237	
1-4 Overhead Cost ("1-3"×10%)	%		10%	10%	19,565	7,159	26,724	
1-5 Subtotal ("1-3"+"1-4")					215,212	78,749	293,961	
<b>2 Tak Culvert Canal</b>								
2-1 Temporary Works	%	"2-2 (12)"×5%	5%	5%	61,139	14,933	76,072	
2-2 Direct Construction Cost								
(1) Site Clearing	ha	40	0	34,400	0	1,376	1,376	
(2) Stripping	m <sup>3</sup>	160,000	53	6	8,480	960	9,440	
(3) Excavation, Common	m <sup>3</sup>	3,099,000	46	5	142,554	15,495	158,049	
(4) Excavation, Weathered Rock	m <sup>3</sup>	770,000	87	9	66,990	6,930	73,920	
(5) Excavation, Rock	m <sup>3</sup>	203,000	525	31	106,575	6,293	112,868	
(6) Backfill	m <sup>3</sup>	3,568,000	48	6	171,264	21,408	192,672	
(7) Laterite Paving	m <sup>3</sup>	8,060	22	198	177	1,596	1,773	
(8) Culvert Concrete	m <sup>3</sup>	169,580	1,529	972	259,288	164,832	424,120	
(9) Form work	m <sup>2</sup>	29,360	104	401	3,053	11,773	14,826	
(10) Reinforced Bar	ton	19,630	20,691	2,739	406,164	53,767	459,931	
(11) Miscellaneous	%	5			58,227	14,222	72,449	
(12) Subtotal ("(1)"+"(11)")					1,222,772	298,652	1,521,424	
2-3 Subtotal ("2-1"+"2-2")					1,283,911	313,585	1,597,496	
2-4 Overhead Cost ("2-3"×10%)	%		10%	10%	128,391	31,359	159,750	
2-5 Subtotal ("2-3"+"2-4")					1,412,302	344,944	1,757,246	
<b>3 Sub-Total ("1"+"2")</b>					1,628,000	424,000	2,052,000	
<b>4 Taxes ("3"×7%)</b>	7%		7%	7%	114,000	30,000	144,000	
<b>5 Total Cost ("3"+"4")</b>					1,742,000	454,000	2,196,000	× 1,000Baht

Table B,Q-3 Construction Cost of Kok-Ing No.2 Tunnel

(1/1)

Item	Unit	Quantity	Rate		Cost × 1,000Baht			Remarks
			F.C.	L.C.	F.C.	L.C.	Total	
Kok-Ing No.2 Tunnel								
1 Common Temporary Works	L.S.	"2-7"×5%	5%	5%	57,344	12,135	69,479	
2 Direct Construction Cost								
2-1 Excavation	m	5,415.02	L.S.	L.S.	241,093	22,252	263,345	
2-2 Shotcrete	m	5,415.02	L.S.	L.S.	172,157	33,745	205,902	
2-3 Rock Bolts	m	5,415.02	L.S.	L.S.	206,099	57,902	264,001	
2-4 Steel Support	m	5,415.02	L.S.	L.S.	278,723	30,360	309,083	
2-5 Concrete Lining	m	5,415.02	L.S.	L.S.	247,204	90,881	338,085	
2-6 Drain Pipe	m	5,415.02	L.S.	L.S.	1,603	7,569	9,172	
2-7 Subtotal ("2-1"+ ~ + "2-6")					1,146,879	242,709	1,389,588	
3 Subtotal ("1"+"2")					1,204,223	254,844	1,459,067	
4 Temporary Works								
4-1 Temporary Works of Inside Tunnel			L.S.	L.S.	21,779	88,843	110,622	
4-2 Temporary Works of Outside Tunnel			L.S.	L.S.	59,875	9,214	69,089	
4-3 Subtotal ("4-1"+"4-2")					81,654	98,057	179,711	
5 Subtotal ("3"+"4")					1,285,877	352,901	1,638,778	
6 Overhead Cost ("5"×10%)	%		10%	10%	128,588	35,290	163,878	
7 Subtotal ("5"+"6")					1,414,000	388,000	1,802,000	
8 Taxes ("7"×7%)	7%		7%	7%	99,000	27,000	126,000	
9 Total Cost ("7"+"8")					1,513,000	415,000	1,928,000	× 1,000Baht

Table B,Q-4 Construction Cost of Ing Canal &amp; Ing Weir

(1/2)

Item	Unit	Quantity	Rate		Cost × 1,000Baht			Remarks
			F.C.	L.C.	F.C.	L.C.	Total	
<b>1 Ing Open Canal</b>								
1-1 Temporary Works	%	"1-2 (19)"×5%	5%	5%	27,006	10,515	37,521	
1-2 Direct Construction Cost								
(1) Site Clearing	ha	256	0	34,400	0	8,806	8,806	
(2) Stripping	m <sup>3</sup>	425,220	53	6	22,537	2,551	25,088	
(3) Excavation, Common	m <sup>3</sup>	3,779,600	61	7	230,556	26,457	257,013	
(4) Fill & Backfill	m <sup>3</sup>	1,040,800	48	6	49,958	6,245	56,203	
(5) Laterite Paving	m <sup>3</sup>	37,400	22	198	823	7,405	8,228	
(6) Lining Concrete	m <sup>3</sup>	99,520	1,370	666	136,342	66,280	202,622	
(7) Structure Concrete	m <sup>3</sup>	0	1,529	972	0	0	0	
(8) Form work	m <sup>2</sup>	0	104	401	0	0	0	
(9) Reinforced Bar	ton	0	20,691	2,739	0	0	0	
(10) Overchute	No.	12	L.S.	L.S.	2,000	5,000	7,000	
(11) Highway Bridge	No.	2	L.S.	L.S.	12,000	6,000	18,000	
(12) Roadway Bridge	No.	18	L.S.	L.S.	15,000	34,000	49,000	
(13) Farm & O/M Roadway Bridge	No.	14	L.S.	L.S.	8,000	19,000	27,000	
(14) Drain Culvert	No.	12	L.S.	L.S.	2,000	3,000	5,000	
(15) Drops	No.	2	L.S.	L.S.	14,000	6,000	20,000	
(16) Check Structure (Gate)	No.	3	L.S.	L.S.	21,000	9,000	30,000	
(17) Turn-out	No.	6	30,000	90,000	180	540	720	
(18) Miscellaneous	%	5			25,720	10,014	35,734	
(19) Subtotal ("(1)"+"(18)")					540,116	210,298	750,414	
1-3 Subtotal ("1-1"+"1-2")					567,122	220,813	787,935	
1-4 Overhead Cost ("1-3"×10%)	%		10%	10%	56,712	22,081	78,793	
1-5 Subtotal ("1-3"+"1-4")					623,834	242,894	866,728	
<b>2 Ing Culvert Canal</b>								
2-1 Temporary Works	%	"2-2 (12)"×5%	5%	5%	10,687	2,942	13,629	
2-2 Direct Construction Cost								
(1) Site Clearing	ha	6	0	34,400	0	206	206	
(2) Stripping	m <sup>3</sup>	27,200	53	6	1,442	163	1,605	
(3) Excavation, Common	m <sup>3</sup>	400,000	46	5	18,400	2,000	20,400	
(4) Excavation, Weathered Rock	m <sup>3</sup>	100,000	87	9	8,700	900	9,600	
(5) Excavation, Rock	m <sup>3</sup>	26,300	525	31	13,808	815	14,623	
(6) Backfill	m <sup>3</sup>	411,600	48	6	19,757	2,470	22,227	
(7) Laterite Paving	m <sup>3</sup>	2,100	22	198	46	416	462	
(8) Culvert Concrete	m <sup>3</sup>	36,000	1,529	972	55,044	34,992	90,036	
(9) Form work	m <sup>2</sup>	6,840	104	401	711	2,743	3,454	
(10) Reinforced Bar	ton	4,140	20,691	2,739	85,661	11,339	97,000	
(11) Miscellaneous	%	5			10,178	2,802	12,980	
(12) Subtotal ("(1)"+"(11)")					213,747	58,846	272,593	
2-3 Subtotal ("2-1"+"2-2")					224,434	61,788	286,222	
2-4 Overhead Cost ("2-3"×10%)	%		10%	10%	22,443	6,179	28,622	
2-5 Subtotal ("2-3"+"2-4")					246,877	67,967	314,844	



Table B,Q-4 Construction Cost of Ing Canal &amp; Ing Weir

(2/2)

Item	Unit	Quantity	Rate		Cost × 1,000Baht			Remarks
			F.C.	L.C.	F.C.	L.C.	Total	
<b>3 Ing Weir</b>								
3-1 Temporary Works	%	*3-2 (17)*5%	5%	5%	11,857	3,453	15,310	
3-2 Direct Construction Cost								
(1) Clearing	ha	6	0	34,400	0	206	206	
(2) Stripping	m <sup>3</sup>	29,000	53	6	1,537	174	1,711	
(3) Excavation, Common	m <sup>3</sup>	110,000	61	7	6,710	770	7,480	
(4) Excavation, River Training	m <sup>3</sup>	1,000,000	61	7	61,000	7,000	68,000	
(5) Fill & Backfill	m <sup>3</sup>	120,000	48	6	5,760	720	6,480	
(6) Concrete Pile φ 600	m	3,200	174	1,566	557	5,011	5,568	
(7) Steel Sheet Pile	m <sup>2</sup>	1,800	4,050	450	7,290	810	8,100	
(8) Foundation Concrete	m <sup>3</sup>	25,000	1,393	670	34,825	16,750	51,575	
(9) Structure Concrete	m <sup>3</sup>	20,000	1,529	972	30,580	19,440	50,020	
(10) Form work	m <sup>2</sup>	9,800	104	401	1,019	3,930	4,949	
(11) Reinforced Bar	ton	1,600	20,691	2,739	33,106	4,382	37,488	
(12) Rubber Gate 32m×3.3m×2span	L.S.	2	21,000,000	2,000,000	42,000	4,000	46,000	
(13) Control Gate	ton	11	90,000	60,000	990	660	1,650	
(14) Stoplog	ton	8	60,000	40,000	480	320	800	
(15) Control House	m <sup>2</sup>	200	0	8,000	0	1,600	1,600	
(16) Miscellaneous	%	5			11,293	3,289	14,582	
(17) Subtotal ("1"+"~"+"(16)")					237,147	69,062	306,209	
3-3 Subtotal ("3-1"+"3-2")					249,004	72,515	321,519	
3-4 Overhead Cost ("3-3"×10%)	%		10%	10%	24,900	7,252	32,152	
3-5 Subtotal ("3-3"+"3-4")					273,904	79,767	353,671	
<b>4 Ing Intake</b>								
4-1 Temporary Works	%	*4-2 (16)*5%	5%	5%	12,034	5,245	17,279	
4-2 Direct Construction Cost								
(1) Site Clearing	ha	17.5	0	34,400	0	602	602	
(2) Stripping	m <sup>3</sup>	88,000	53	6	4,664	528	5,192	
(3) Excavation, Common	m <sup>3</sup>	580,000	61	7	35,380	4,060	39,440	
(4) Fill & Backfill	m <sup>3</sup>	360,000	48	6	17,280	2,160	19,440	
(5) Concrete Pile φ 600	m	5,200	174	1,566	905	8,143	9,048	
(6) Steel Sheet Pile	m <sup>2</sup>	2,000	4,050	450	8,100	900	9,000	
(7) Plain Concrete	m <sup>3</sup>	37,000	1,393	670	51,541	24,790	76,331	
(8) Structure Concrete	m <sup>3</sup>	25,000	1,529	972	38,225	24,300	62,525	
(9) Form work	m <sup>2</sup>	18,600	104	401	1,934	7,459	9,393	
(10) Reinforced Bar	ton	2,000	20,691	2,739	41,382	5,478	46,860	
(11) Intake Gate	ton	169	90,000	60,000	15,210	10,140	25,350	
(12) Trash Rack	ton	438	18,000	12,000	7,884	5,256	13,140	
(13) Stoplog	ton	112	60,000	40,000	6,720	4,480	11,200	
(14) Control House	m <sup>2</sup>	200	0	8,000	0	1,600	1,600	
(15) Miscellaneous	%	5			11,461	4,995	16,456	
(16) Subtotal ("1"+"~"+"(15)")					240,686	104,891	345,577	
4-3 Subtotal ("4-1"+"4-2")					252,720	110,136	362,856	
4-4 Overhead Cost ("4-3"×10%)	%		10%	10%	25,272	11,014	36,286	
4-5 Subtotal ("4-3"+"4-4")					277,992	121,150	399,142	
<b>5 Sub-Total ("1"+"~"+"4")</b>					1,423,000	512,000	1,935,000	
<b>6 Taxes ("5"×7%)</b>	7%		7%	7%	100,000	36,000	136,000	
<b>7 Total Cost ("5"+"6")</b>					1,523,000	548,000	2,071,000	× 1,000Baht

Table B,Q-5 Construction Cost of Ing-Yot Canal &amp; Ing-Yot No.1 Tunnel

(1/2)

Item	Unit	Quantity	Rate		Cost × 1,000Baht			Remarks
			F.C.	L.C.	F.C.	L.C.	Total	
1 Ing-Yot Open Canal								
1-1 Temporary Works	%	*1-2 (14)*5%	5%	5%	2,838	689	3,527	
1-2 Direct Construction Cost								
(1) Site Clearing	ha	19	0	34,400	0	654	654	
(2) Stripping	m <sup>3</sup>	50,900	53	6	2,698	305	3,003	
(3) Excavation, Common	m <sup>3</sup>	387,300	61	7	23,625	2,711	26,336	
(4) Fill & Backfill	m <sup>3</sup>	264,900	48	6	12,715	1,589	14,304	
(5) Laterite Paving	m <sup>3</sup>	2,970	22	198	65	588	653	
(6) Lining Concrete	m <sup>3</sup>	10,880	1,370	666	14,906	7,246	22,152	
(7) Structure Concrete	m <sup>3</sup>	0	1,529	972	0	0	0	
(8) Form work	m <sup>2</sup>	0	104	401	0	0	0	
(9) Reinforced Bar	ton	0	20,691	2,739	0	0	0	
(10) Highway Bridge	No.	0	L.S.	L.S.	0	0	0	
(11) Roadway Bridge	No.	0	L.S.	L.S.	0	0	0	
(12) Trashrack	ton	3	18,000	12,000	54	36	90	
(13) Miscellaneous	%	5			2,703	656	3,359	
(14) Subtotal ("(1)" + ~ + "(13)")					56,766	13,785	70,551	
1-3 Subtotal ("1-1" + "1-2")					59,604	14,474	74,078	
1-4 Overhead Cost ("1-3" × 10%)	%		10%	10%	5,960	1,447	7,407	
1-5 Subtotal ("1-3" + "1-4")					65,564	15,921	81,485	
2 Ing-Yot Culvert Canal (1)								
2-1 Temporary Works	%	*2-2 (12)*5%	5%	5%	62,119	14,816	76,935	
2-2 Direct Construction Cost								
(1) Site Clearing	ha	29	0	34,400	0	998	998	
(2) Stripping	m <sup>3</sup>	139,000	53	6	7,367	834	8,201	
(3) Excavation, Common	m <sup>3</sup>	3,268,500	46	5	150,351	16,343	166,694	
(4) Excavation, Weathered Rock	m <sup>3</sup>	815,000	87	9	70,905	7,335	78,240	
(5) Excavation, Rock	m <sup>3</sup>	215,000	525	31	112,875	6,665	119,540	
(6) Backfill	m <sup>3</sup>	3,783,000	48	6	181,584	22,698	204,282	
(7) Laterite Paving	m <sup>3</sup>	14,050	22	198	309	2,782	3,091	
(8) Culvert Concrete	m <sup>3</sup>	163,650	1,529	972	250,221	159,068	409,289	
(9) Form works	m <sup>2</sup>	29,100	104	401	3,026	11,669	14,695	
(10) Reinforced Bar	ton	19,650	20,691	2,739	406,578	53,821	460,399	
(11) Miscellaneous	%	5			59,161	14,111	73,272	
(12) Subtotal ("(1)" + ~ + "(11)")					1,242,377	296,324	1,538,701	
2-3 Subtotal ("2-1" + "2-2")					1,304,496	311,140	1,615,636	
2-4 Overhead Cost ("2-3" × 10%)	%		10%	10%	130,450	31,114	161,564	
2-5 Subtotal ("2-3" + "2-4")					1,434,946	342,254	1,777,200	
3 Ing-Yot No.1 Tunnel								
3-1 Common Temporary Works	L.S.	*3-2 (7)*5%	5%	5%	23,385	4,960	28,345	
3-2 Direct Construction Cost								
(1) Excavation	m	2,008.213	L.S.	L.S.	98,176	9,028	107,204	
(2) Shotcrete	m	2,008.213	L.S.	L.S.	69,869	13,454	83,323	
(3) Rock Bolts	m	2,008.213	L.S.	L.S.	83,872	23,835	107,707	
(4) Steel Support	m	2,008.213	L.S.	L.S.	117,845	12,738	130,583	
(5) Concrete Lining	m	2,008.213	L.S.	L.S.	97,312	36,742	134,054	
(6) Drain Pipe	m	2,008.213	L.S.	L.S.	621	3,397	4,018	
(7) Subtotal ("(1)" + ~ + "(6)")					467,695	99,194	566,889	
3-3 Subtotal ("3-1" + "3-2")					491,080	104,154	595,234	

**Table B,Q-5 Construction Cost of Ing-Yot Canal & Ing-Yot No.1 Tunnel**

(2/2)

Item	Unit	Quantity	Rate		Cost × 1,000Baht			Remarks
			F.C.	L.C.	F.C.	L.C.	Total	
<b>3-4 Temporary Works</b>								
(1) Temporary Works of Inside Tunnel			L.S.	L.S.	8,247	39,265	47,512	
(2) Temporary Works of Outside Tunnel			L.S.	L.S.	41,470	4,866	46,336	
(3) Subtotal ("(1)"+"(2)")					49,717	44,131	93,848	
<b>3-5 Subtotal ("3-3"+"3-4")</b>					540,797	148,285	689,082	
<b>3-6 Overhead Cost ("3-5"×10%)</b>	%		10%	10%	54,080	14,829	68,909	
<b>3-7 Subtotal ("3-5"+"3-6")</b>					594,877	163,114	757,991	
<b>4 Sub-Total ("1"+++"3")</b>					2,095,000	521,000	2,616,000	
<b>5 Taxes ("4"×7%)</b>	7%		7%	7%	147,000	36,000	183,000	
<b>6 Total Cost ("4"+"5")</b>					2,242,000	557,000	2,799,000	× 1,000Baht

Table B,Q-6 Construction Cost of Ing-Yot Culvert &amp; Ing-Yot No.2 Tunnel Div.1

(1/1)

Item	Unit	Quantity	Rate		Cost × 1,000Baht			Remarks
			F.C.	L.C.	F.C.	L.C.	Total	
<b>1 Ing-Yot Culvert Canal (2)</b>								
1-1 Temporary Works	%	"1-2 (12)"×5%	5%	5%	62,119	14,816	76,935	
1-2 Direct Construction Cost								
(1) Site Clearing	ha	29	0	34,400	0	998	998	
(2) Stripping	m <sup>3</sup>	139,000	53	6	7,367	834	8,201	
(3) Excavation, Common	m <sup>3</sup>	3,268,500	46	5	150,351	16,343	166,694	
(4) Excavation, Weathered Rock	m <sup>3</sup>	815,000	87	9	70,905	7,335	78,240	
(5) Excavation, Rock	m <sup>3</sup>	215,000	525	31	112,875	6,665	119,540	
(6) Backfill	m <sup>3</sup>	3,783,000	48	6	181,584	22,698	204,282	
(7) Laterite Paving	m <sup>3</sup>	14,050	22	198	309	2,782	3,091	
(8) Culvert Concrete	m <sup>3</sup>	163,650	1,529	972	250,221	159,068	409,289	
(9) Form works	m <sup>2</sup>	29,100	104	401	3,026	11,669	14,695	
(10) Reinforced Bar	ton	19,650	20,691	2,739	406,578	53,821	460,399	
(11) Miscellaneous	%	5			59,161	14,111	73,272	
(12) Subtotal ("(1)"+"~"+"(11)")					1,242,377	296,324	1,538,701	
1-3 Subtotal ("1-1"+"1-2")					1,304,496	311,140	1,615,636	
1-4 Overhead Cost ("1-3"×10%)	%		10%	10%	130,450	31,114	161,564	
1-5 Subtotal ("1-3"+"1-4")					1,434,946	342,254	1,777,200	
<b>2 Ing-Yot No.2 Tunnel Division 1</b>								
2-1 Common Temporary Works	L.S.	"2-2 (7)"×5%	5%	5%	51,498	10,573	62,071	
2-2 Direct Construction Cost								
(1) Excavation	m	4,910.0	L.S.	L.S.	269,566	22,278	291,844	
(2) Shotcrete	m	4,910.0	L.S.	L.S.	149,665	28,732	178,397	
(3) Rock Bolts	m	4,910.0	L.S.	L.S.	169,005	47,115	216,120	
(4) Steel Support	m	4,910.0	L.S.	L.S.	228,340	24,776	253,116	
(5) Concrete Lining	m	4,910.0	L.S.	L.S.	211,874	80,286	292,160	
(6) Drain Pipe	m	4,910.0	L.S.	L.S.	1,514	8,269	9,783	
(7) Subtotal ("(1)"+"~"+"(6)")					1,029,964	211,456	1,241,420	
2-3 Subtotal ("2-1"+"2-2")					1,081,462	222,029	1,303,491	
2-4 Temporary Works								
(1) Temporary Works of Inside Tunnel			L.S.	L.S.	19,759	94,849	114,608	
(2) Temporary Works of Outside Tunnel			L.S.	L.S.	54,104	8,933	63,037	
(3) Subtotal ("(1)"+"(2)")					73,863	103,782	177,645	
2-5 Subtotal ("2-3"+"2-4")					1,155,325	325,811	1,481,136	
2-6 Overhead Cost ("2-5"×10%)	%		10%	10%	115,533	32,581	148,114	
2-7 Subtotal ("2-5"+"2-6")					1,270,858	358,392	1,629,250	
<b>3 Sub-Total ("1"+"2")</b>					2,706,000	701,000	3,407,000	
<b>4 Taxes ("3"×7%)</b>	7%		7%	7%	189,000	49,000	238,000	
<b>5 Total Cost ("3"+"4")</b>					2,895,000	750,000	3,645,000	× 1,000Baht

Table B,Q-7 Construction Cost of Ing-Yot No.2 Tunnel Div.2 &amp; Div.3

(1/2)

Item	Unit	Quantity	Rate		Cost × 1,000Baht			Remarks
			F.C.	L.C.	F.C.	L.C.	Total	
1 Ing-Yot No.2 Tunnel, Division 2 with Adit No.1								
1-1 Common Temporary Works	L.S.	*1-2-3*5%	5%	5%	55,733	11,172	66,905	
1-2 Direct Construction Cost								
1-2-1 Main Tunnel : Div.2 L=4,550.0m								
(1) Excavation	m	4,550.00	L.S.	L.S.	293,315	21,497	314,812	
(2) Shotcrete	m	4,550.00	L.S.	L.S.	114,867	22,333	137,200	
(3) Rock Bolts	m	4,550.00	L.S.	L.S.	125,794	35,261	161,055	
(4) Steel Support	m	4,550.00	L.S.	L.S.	122,610	13,276	135,886	
(5) Concrete Lining	m	4,550.00	L.S.	L.S.	157,141	62,444	219,585	
(6) Drain Pipe	m	4,550.00	L.S.	L.S.	1,385	6,619	8,004	
(7) Subtotal ("(1)" + ~ + "(6)")					815,112	161,430	976,542	
1-2-2 Adit No.1 L=1,981.99 m								
(1) Excavation	m	1,981.99	L.S.	L.S.	66,336	5,851	72,187	
(2) Shotcrete	m	1,981.99	L.S.	L.S.	47,241	9,117	56,358	
(3) Rock Bolts	m	1,981.99	L.S.	L.S.	55,024	15,642	70,666	
(4) Steel Support	m	1,981.99	L.S.	L.S.	66,087	7,247	73,334	
(5) Concrete Lining	m	1,981.99	L.S.	L.S.	64,398	22,457	86,855	
(6) Drain Pipe	m	1,981.99	L.S.	L.S.	469	1,705	2,174	
(7) Subtotal ("(1)" + ~ + "(6)")					299,555	62,019	361,574	
1-2-3 Subtotal ("1-2-1" + "1-2-2")								
					1,114,667	223,449	1,338,116	
1-3 Subtotal ("1-1" + "1-2")								
					1,170,400	234,621	1,405,021	
1-4 Temporary Works								
1-4-1 Main Tunnel : Div.2 L=4,550.0m								
(1) Temporary Works of Inside Tunnel			L.S.	L.S.	17,965	79,136	97,101	
(2) Temporary Works of Outside Tunnel			L.S.	L.S.	51,780	6,081	57,861	
(3) Subtotal ("(1)" + "(2)")					69,745	85,217	154,962	
1-4-2 Adit No.1 L=1,981.99 m								
(1) Temporary Works of Inside Tunnel			L.S.	L.S.	7,945	32,882	40,827	
(2) Temporary Works of Outside Tunnel			L.S.	L.S.	15,175	5,357	20,532	
(3) Subtotal ("(1)" + "(2)")					23,120	38,239	61,359	
1-4-3 Subtotal ("1-4-1" + "1-4-2")								
					92,865	123,456	216,321	
1-5 Subtotal ("1-3" + "1-4")								
					1,263,265	358,077	1,621,342	
1-6 Overhead Cost ("1-5"×10%)								
	%		10%	10%	126,327	35,808	162,135	
1-7 Subtotal ("1-5" + "1-6")								
					1,389,592	393,885	1,783,477	

Table B,Q-7 Construction Cost of Ing-Yot No.2 Tunnel Div.2 &amp; Div.3

(2/2)

Item	Unit	Quantity	Rate		Cost × 1,000Baht			Remarks
			F.C.	L.C.	F.C.	L.C.	Total	
2 Ing-Yot No.2 Tunnel, Division 3 with Adit No.2								
2-1 Common Temporary Works	L.S.	*2-2-3*×5%	5%	5%	64,283	12,977	77,260	
2-2 Direct Construction Cost								
2-2-1 Main Tunnel : Div.3 L=5,435.0 m								
(1) Excavation	m	5,435.00	L.S.	L.S.	343,666	25,731	369,397	
(2) Shotcrete	m	5,435.00	L.S.	L.S.	144,322	28,101	172,423	
(3) Rock Bolts	m	5,435.00	L.S.	L.S.	161,433	45,527	206,960	
(4) Steel Support	m	5,435.00	L.S.	L.S.	167,680	18,129	185,809	
(5) Concrete Lining	m	5,435.00	L.S.	L.S.	201,775	79,190	280,965	
(6) Drain Pipe	m	5,435.00	L.S.	L.S.	1,662	7,943	9,605	
(7) Subtotal ("(1)" + ~ + "(6)")					1,020,538	204,621	1,225,159	
2-2-2 Adit No.2 L=1,785.19 m								
(1) Excavation	m	1,785.19	L.S.	L.S.	57,312	5,177	62,489	
(2) Shotcrete	m	1,785.19	L.S.	L.S.	41,316	8,007	49,323	
(3) Rock Bolts	m	1,785.19	L.S.	L.S.	48,930	13,886	62,816	
(4) Steel Support	m	1,785.19	L.S.	L.S.	62,004	6,788	68,792	
(5) Concrete Lining	m	1,785.19	L.S.	L.S.	55,144	19,543	74,687	
(6) Drain Pipe	m	1,785.19	L.S.	L.S.	420	1,522	1,942	
(7) Subtotal ("(1)" + ~ + "(6)")					265,126	54,923	320,049	
2-2-3 Subtotal ("2-2-1" + "2-2-2")								
					1,285,664	259,544	1,545,208	
2-3 Subtotal ("2-1" + "2-2")								
					1,349,947	272,521	1,622,468	
2-4 Temporary Works								
2-4-1 Main Tunnel : Div.3 L=5,435.0 m								
(1) Temporary Works of Inside Tunnel			L.S.	L.S.	21,139	81,375	102,514	
(2) Temporary Works of Outside Tunnel			L.S.	L.S.	54,893	7,050	61,943	
(3) Subtotal ("(1)" + "(2)")					76,032	88,425	164,457	
2-4-2 Adit No.2 L=1,785.19 m								
(1) Temporary Works of Inside Tunnel			L.S.	L.S.	7,215	30,917	38,132	
(2) Temporary Works of Outside Tunnel			L.S.	L.S.	21,020	6,596	27,616	
(3) Subtotal ("(1)" + "(2)")					28,235	37,513	65,748	
2-4-3 Subtotal ("2-4-1" + "2-4-2")								
					104,267	125,938	230,205	
2-5 Subtotal ("2-3" + "2-4")								
					1,454,214	398,459	1,852,673	
2-6 Overhead Cost ("2-5"×10%)								
	%		10%	10%	145,421	39,846	185,267	
2-7 Subtotal ("2-5" + "2-6")								
					1,599,635	438,305	2,037,940	
3 Sub-Total ("1" + "2")								
					2,989,000	832,000	3,821,000	
4 Taxes ("3"×7%)								
	7%		7%	7%	209,000	58,000	267,000	
5 Total Cost ("3" + "4")								
					3,198,000	890,000	4,088,000	× 1,000Baht

Table B,Q-8 Construction Cost of Ing-Yot No.2 Tunnel Div.4 &amp; Div.5

(1/2)

Item	Unit	Quantity	Rate		Cost × 1,000Baht			Remarks
			F.C.	L.C.	F.C.	L.C.	Total	
1 Ing-Yot No.2 Tunnel, Division 4 with Adit No.3								
1-1 Common Temporary Works	L.S.	"1-2-3"×5%	5%	5%	78,446	15,550	93,996	
1-2 Direct Construction Cost								
1-2-1 Main Tunnel : Div.4 L=7,215.0 m								
(1) Excavation	m	7,215.00	L.S.	L.S.	457,973	34,010	491,983	
(2) Shotcrete	m	7,215.00	L.S.	L.S.	181,463	35,580	217,043	
(3) Rock Bolts	m	7,215.00	L.S.	L.S.	204,112	57,096	261,208	
(4) Steel Support	m	7,215.00	L.S.	L.S.	208,888	22,613	231,501	
(5) Concrete Lining	m	7,215.00	L.S.	L.S.	250,552	99,584	350,136	
(6) Drain Pipe	m	7,215.00	L.S.	L.S.	2,196	10,485	12,681	
(7) Subtotal ("(1)" + ~ + "(6)")					1,305,184	259,368	1,564,552	
1-2-2 Adit No.3 L=2,193.75 m								
(1) Excavation	m	2,193.75	L.S.	L.S.	87,164	6,587	93,751	
(2) Shotcrete	m	2,193.75	L.S.	L.S.	40,022	7,809	47,831	
(3) Rock Bolts	m	2,193.75	L.S.	L.S.	40,662	11,632	52,294	
(4) Steel Support	m	2,193.75	L.S.	L.S.	36,020	3,954	39,974	
(5) Concrete Lining	m	2,193.75	L.S.	L.S.	59,348	19,797	79,145	
(6) Drain Pipe	m	2,193.75	L.S.	L.S.	513	1,857	2,370	
(7) Subtotal ("(1)" + ~ + "(6)")					263,729	51,636	315,365	
1-2-3 Subtotal ("1-2-1" + "1-2-2")								
					1,568,913	311,004	1,879,917	
1-3 Subtotal ("1-1" + "1-2")								
					1,647,359	326,554	1,973,913	
1-4 Temporary Works								
1-4-1 Main Tunnel : Div.4 L=7,215.0 m								
(1) Temporary Works of Inside Tunnel			L.S.	L.S.	27,558	82,094	109,652	
(2) Temporary Works of Outside Tunnel			L.S.	L.S.	63,459	9,555	73,014	
(3) Subtotal ("(1)" + "(2)")					91,017	91,649	182,666	
1-4-2 Adit No.3 L=2,193.75 m								
(1) Temporary Works of Inside Tunnel			L.S.	L.S.	8,725	34,849	43,574	
(2) Temporary Works of Outside Tunnel			L.S.	L.S.	17,321	4,799	22,120	
(3) Subtotal ("(1)" + "(2)")					26,046	39,648	65,694	
1-4-3 Subtotal ("1-4-1" + "1-4-2")								
					117,063	131,297	248,360	
1-5 Subtotal ("1-3" + "1-4")								
					1,764,422	457,851	2,222,273	
1-6 Overhead Cost ("1-5"×10%)								
	%		10%	10%	176,442	45,785	222,227	
1-7 Subtotal ("1-5" + "1-6")								
					1,940,864	503,636	2,444,500	

Table B,Q-8 Construction Cost of Ing-Yot No.2 Tunnel Div.4 &amp; Div.5

(2/2)

Item	Unit	Quantity	Rate		Cost × 1,000Baht			Remarks
			F.C.	L.C.	F.C.	L.C.	Total	
2 Ing-Yot No.2 Tunnel, Division 5 with Adit No.4								
2-1 Common Temporary Works	L.S.	*2-2-3*×5%	5%	5%	72,462	14,005	86,467	
2-2 Direct Construction Cost								
2-2-1 Main Tunnel : Div.5 L=6,440.0 m								
(1) Excavation	m	6,440.00	L.S.	L.S.	429,454	30,743	460,197	
(2) Shotcrete	m	6,440.00	L.S.	L.S.	147,777	29,087	176,864	
(3) Rock Bolts	m	6,440.00	L.S.	L.S.	160,922	44,322	205,244	
(4) Steel Support	m	6,440.00	L.S.	L.S.	152,135	16,535	168,670	
(5) Concrete Lining	m	6,440.00	L.S.	L.S.	207,087	83,035	290,122	
(6) Drain Pipe	m	6,440.00	L.S.	L.S.	1,957	9,345	11,302	
(7) Subtotal ("(1)" + ~ + "(6)")					1,099,332	213,067	1,312,399	
2-2-2 Adit No.4 L=3,171.48 m								
(1) Excavation	m	3,171.48	L.S.	L.S.	127,193	9,374	136,567	
(2) Shotcrete	m	3,171.48	L.S.	L.S.	54,489	10,571	65,060	
(3) Rock Bolts	m	3,171.48	L.S.	L.S.	51,923	14,730	66,653	
(4) Steel Support	m	3,171.48	L.S.	L.S.	36,301	3,981	40,282	
(5) Concrete Lining	m	3,171.48	L.S.	L.S.	79,262	25,711	104,973	
(6) Drain Pipe	m	3,171.48	L.S.	L.S.	740	2,672	3,412	
(7) Subtotal ("(1)" + ~ + "(6)")					349,908	67,039	416,947	
2-2-3 Subtotal ("2-2-1" + "2-2-2")					1,449,240	280,106	1,729,346	
2-3 Subtotal ("2-1" + "2-2")					1,521,702	294,111	1,815,813	
2-4 Temporary Works								
2-4-1 Main Tunnel : Div.5 L=6,440.0 m								
(1) Temporary Works of Inside Tunnel			L.S.	L.S.	24,550	70,473	95,023	
(2) Temporary Works of Outside Tunnel			L.S.	L.S.	59,211	8,459	67,670	
(3) Subtotal ("(1)" + "(2)")					83,761	78,932	162,693	
2-4-2 Adit No.4 L=3,171.48 m								
(1) Temporary Works of Inside Tunnel			L.S.	L.S.	12,393	42,788	55,181	
(2) Temporary Works of Outside Tunnel			L.S.	L.S.	20,248	6,990	27,238	
(3) Subtotal ("(1)" + "(2)")					32,641	49,778	82,419	
2-4-3 Subtotal ("2-4-1" + "2-4-2")					116,402	128,710	245,112	
2-5 Subtotal ("2-3" + "2-4")					1,638,104	422,821	2,060,925	
2-6 Overhead Cost ("2-5"×10%)			10%	10%	163,810	42,282	206,092	
2-7 Subtotal ("2-5" + "2-6")					1,801,914	465,103	2,267,017	
3 Sub-Total ("1" + "2")					3,743,000	969,000	4,712,000	
4 Taxes ("3"×7%)	7%		7%	7%	262,000	68,000	330,000	
5 Total Cost ("3" + "4")					4,005,000	1,037,000	5,042,000	× 1,000Baht



Table B,Q-9 Construction Cost of Ing-Yot No.2 Tunnel Div.6 &amp; Div.7

(1/2)

Item	Unit	Quantity	Rate		Cost × 1,000Baht			Remarks
			F.C.	L.C.	F.C.	L.C.	Total	
1 Ing-Yot No.2 Tunnel, Division 6 with Adit No.5								
1-1 Common Temporary Works	L.S.	*1-2-3*×5%	5%	5%	74,356	14,776	89,132	
1-2 Direct Construction Cost								
1-2-1 Main Tunnel : Div.6 L=6,400 m								
(1) Excavation	m	6,400.0	L.S.	L.S.	404,516	30,244	434,760	
(2) Shotcrete	m	6,400.0	L.S.	L.S.	162,966	31,712	194,678	
(3) Rock Bolts	m	6,400.0	L.S.	L.S.	179,822	50,233	230,055	
(4) Steel Support	m	6,400.0	L.S.	L.S.	194,403	21,073	215,476	
(5) Concrete Lining	m	6,400.0	L.S.	L.S.	228,087	89,933	318,020	
(6) Drain Pipe	m	6,400.0	L.S.	L.S.	1,952	9,333	11,285	
(7) Subtotal ("(1)" + ~ + "(6)")					1,171,746	232,528	1,404,274	
1-2-2 Adit No.5 L=2,476.0 m								
(1) Excavation	m	2,476.0	L.S.	L.S.	90,611	7,304	97,915	
(2) Shotcrete	m	2,476.0	L.S.	L.S.	48,683	9,416	58,099	
(3) Rock Bolts	m	2,476.0	L.S.	L.S.	51,545	14,724	66,269	
(4) Steel Support	m	2,476.0	L.S.	L.S.	55,457	6,078	61,535	
(5) Concrete Lining	m	2,476.0	L.S.	L.S.	68,499	23,380	91,879	
(6) Drain Pipe	m	2,476.0	L.S.	L.S.	579	2,094	2,673	
(7) Subtotal ("(1)" + ~ + "(6)")					315,374	62,996	378,370	
1-2-3 Subtotal ("1-2-1" + "1-2-2")								
					1,487,120	295,524	1,782,644	
1-3 Subtotal ("1-1" + "1-2")								
					1,561,476	310,300	1,871,776	
1-4 Temporary Works								
1-4-1 Main Tunnel : Div.6 L=6,400 m								
(1) Temporary Works of Inside Tunnel			L.S.	L.S.	24,525	76,108	100,633	
(2) Temporary Works of Outside Tunnel			L.S.	L.S.	59,294	8,516	67,810	
(3) Subtotal ("(1)" + "(2)")					83,819	84,624	168,443	
1-4-2 Adit No.5 L=2,476.0 m								
(1) Temporary Works of Inside Tunnel			L.S.	L.S.	9,798	36,851	46,649	
(2) Temporary Works of Outside Tunnel			L.S.	L.S.	15,740	5,518	21,258	
(3) Subtotal ("(1)" + "(2)")					25,538	42,369	67,907	
1-4-3 Subtotal ("1-4-1" + "1-4-2")								
					109,357	126,993	236,350	
1-5 Subtotal ("1-3" + "1-4")								
					1,670,833	437,293	2,108,126	
1-6 Overhead Cost ("1-5"×10%)								
%			10%	10%	167,083	43,729	210,812	
1-7 Subtotal ("1-5" + "1-6")								
					1,837,916	481,022	2,318,938	

Table B,Q-9 Construction Cost of Ing-Yot No.2 Tunnel Div.6 &amp; Div.7

(2/2)

Item	Unit	Quantity	Rate		Cost × 1,000Baht			Remarks
			F.C.	L.C.	F.C.	L.C.	Total	
2 Ing-Yot No.2 Tunnel, Division 7 with Adit No.6								
2-1 Common Temporary Works	L.S.	*2-2-3*×5%	5%	5%	68,092	13,017	81,109	
2-2 Direct Construction Cost								
2-2-1 Main Tunnel : Div.7 L=6,060.0 m								
(1) Excavation	m	6,060.0	L.S.	L.S.	422,984	29,386	452,370	
(2) Shotcrete	m	6,060.0	L.S.	L.S.	137,039	26,763	163,802	
(3) Rock Bolts	m	6,060.0	L.S.	L.S.	142,579	39,677	182,256	
(4) Steel Support	m	6,060.0	L.S.	L.S.	109,995	11,931	121,926	
(5) Concrete Lining	m	6,060.0	L.S.	L.S.	196,823	78,278	275,101	
(6) Drain Pipe	m	6,060.0	L.S.	L.S.	1,843	8,794	10,637	
(7) Subtotal ("(1)" + ~ + "(6)")					1,011,263	194,829	1,206,092	
2-2-2 Adit No.6 L=3,338.6m								
(1) Excavation	m	3,338.6	L.S.	L.S.	138,135	9,809	147,944	
(2) Shotcrete	m	3,338.6	L.S.	L.S.	52,342	10,402	62,744	
(3) Rock Bolts	m	3,338.6	L.S.	L.S.	48,697	13,607	62,304	
(4) Steel Support	m	3,338.6	L.S.	L.S.	31,013	3,398	34,411	
(5) Concrete Lining	m	3,338.6	L.S.	L.S.	79,608	25,492	105,100	
(6) Drain Pipe	m	3,338.6	L.S.	L.S.	777	2,803	3,580	
(7) Subtotal ("(1)" + ~ + "(6)")					350,572	65,511	416,083	
2-2-3 Subtotal ("2-2-1" + "2-2-2")					1,361,835	260,340	1,622,175	
2-3 Subtotal ("2-1" + "2-2")					1,429,927	273,357	1,703,284	
2-4 Temporary Works								
2-4-1 Main Tunnel : Div.7 L=6,060.0 m								
(1) Temporary Works of Inside Tunnel			L.S.	L.S.	23,170	66,556	89,726	
(2) Temporary Works of Outside Tunnel			L.S.	L.S.	57,657	7,959	65,616	
(3) Subtotal ("(1)" + "(2)")					80,827	74,515	155,342	
2-4-2 Adit No.6 L=3,338.6m								
(1) Temporary Works of Inside Tunnel			L.S.	L.S.	12,983	44,729	57,712	
(2) Temporary Works of Outside Tunnel			L.S.	L.S.	25,387	9,122	34,509	
(3) Subtotal ("(1)" + "(2)")					38,370	53,851	92,221	
2-4-3 Subtotal ("2-4-1" + "2-4-2")					119,197	128,366	247,563	
2-5 Subtotal ("2-3" + "2-4")					1,549,124	401,723	1,950,847	
2-6 Overhead Cost ("2-5"×10%)					154,912	40,172	195,084	
2-7 Subtotal ("2-5" + "2-6")					1,704,036	441,895	2,145,931	
3 Sub-Total ("1" + "2")					3,542,000	923,000	4,465,000	
4 Taxes ("3"×7%)					248,000	65,000	313,000	
5 Total Cost ("3" + "4")					3,790,000	988,000	4,778,000	× 1,000Baht

Table B,Q-10 Construction Cost of Ing-Yot No.2 Tunnel Div.8 &amp; Div.9

(1/1)

Item	Unit	Quantity	Rate		Cost × 1,000Baht			Remarks
			F.C.	L.C.	F.C.	L.C.	Total	
1 Ing-Yot No.2 Tunnel, Division 8 with Adit No.7								
1-1 Common Temporary Works	L.S.	*1-2-3*×5%	5%	5%	53,729	10,235	63,964	
1-2 Direct Construction Cost								
1-2-1 Main Tunnel : Div.8 L=4,950.0 m								
(1) Excavation	m	4,950.00	L.S.	L.S.	343,333	23,971	367,304	
(2) Shotcrete	m	4,950.00	L.S.	L.S.	110,295	21,470	131,765	
(3) Rock Bolts	m	4,950.00	L.S.	L.S.	113,026	31,108	144,134	
(4) Steel Support	m	4,950.00	L.S.	L.S.	94,135	10,247	104,382	
(5) Concrete Lining	m	4,950.00	L.S.	L.S.	159,132	63,110	222,242	
(6) Drain Pipe	m	4,950.00	L.S.	L.S.	1,505	7,182	8,687	
(7) Subtotal ("(1)" + ~ + "(6)")					821,426	157,088	978,514	
1-2-2 Adit No.7 L=2,431.92m								
(1) Excavation	m	2,431.92	L.S.	L.S.	100,751	7,189	107,940	
(2) Shotcrete	m	2,431.92	L.S.	L.S.	38,211	7,533	45,744	
(3) Rock Bolts	m	2,431.92	L.S.	L.S.	35,968	10,164	46,132	
(4) Steel Support	m	2,431.92	L.S.	L.S.	20,476	2,237	22,713	
(5) Concrete Lining	m	2,431.92	L.S.	L.S.	57,184	18,448	75,632	
(6) Drain Pipe	m	2,431.92	L.S.	L.S.	564	2,037	2,601	
(7) Subtotal ("(1)" + ~ + "(6)")					253,154	47,608	300,762	
1-2-3 Subtotal ("1-2-1" + "1-2-2")								
					1,074,580	204,696	1,279,276	
1-3 Subtotal ("1-1" + "1-2")								
					1,128,309	214,931	1,343,240	
1-4 Temporary Works								
1-4-1 Main Tunnel : Div.8 L=4,950.0 m								
(1) Temporary Works of Inside Tunnel			L.S.	L.S.	19,373	77,415	96,788	
(2) Temporary Works of Outside Tunnel			L.S.	L.S.	52,242	6,509	58,751	
(3) Subtotal ("(1)" + "(2)")					71,615	83,924	155,539	
1-4-2 Adit No.7 L=2,431.92m								
(1) Temporary Works of Inside Tunnel			L.S.	L.S.	9,593	36,827	46,420	
(2) Temporary Works of Outside Tunnel			L.S.	L.S.	24,428	7,454	31,882	
(3) Subtotal ("(1)" + "(2)")					34,021	44,281	78,302	
1-4-3 Subtotal ("1-4-1" + "1-4-2")								
					105,636	128,205	233,841	
1-5 Subtotal ("1-3" + "1-4")								
					1,233,945	343,136	1,577,081	
1-6 Overhead Cost ("1-5"×10%)	%		10%	10%	123,395	34,314	157,709	
1-7 Subtotal ("1-5" + "1-6")								
					1,357,340	377,450	1,734,790	
2 Ing-Yot No.2 Tunnel, Division 9								
2-1 Common Temporary Works	L.S.	*2-2 (7)*×5%	5%	5%	51,207	10,504	61,711	
2-2 Direct Construction Cost								
(1) Excavation	m	4,914.6	L.S.	L.S.	278,043	22,514	300,557	
(2) Shotcrete	m	4,914.6	L.S.	L.S.	147,765	28,489	176,254	
(3) Rock Bolts	m	4,914.6	L.S.	L.S.	167,562	46,896	214,458	
(4) Steel Support	m	4,914.6	L.S.	L.S.	219,319	23,789	243,108	
(5) Concrete Lining	m	4,914.6	L.S.	L.S.	209,935	80,090	290,025	
(6) Drain Pipe	m	4,914.6	L.S.	L.S.	1,517	8,296	9,813	
(7) Subtotal ("(1)" + ~ + "(6)")					1,024,141	210,074	1,234,215	
2-3 Subtotal ("2-1" + "2-2")								
					1,075,348	220,578	1,295,926	
2-4 Temporary Works								
(1) Temporary Works of Inside Tunnel			L.S.	L.S.	19,766	94,850	114,616	
(2) Temporary Works of Outside Tunnel			L.S.	L.S.	61,875	10,967	72,842	
(3) Subtotal ("(1)" + "(2)")					81,641	105,817	187,458	
2-5 Subtotal ("2-3" + "2-4")								
					1,156,989	326,395	1,483,384	
2-6 Overhead Cost ("2-5"×10%)	%		10%	10%	115,699	32,640	148,339	
2-7 Subtotal ("2-5" + "2-6")								
					1,272,688	359,035	1,631,723	
3 Sub-Total ("1" + "2")								
					2,630,000	736,000	3,366,000	
4 Taxes ("3"×7%)	7%		7%	7%	184,000	52,000	236,000	
5 Total Cost ("3" + "4")								
					2,814,000	788,000	3,602,000	× 1,000Baht

Table B,Q-11 Construction Cost of Yao Dam &amp; Yot and Yao River Training

(1/5)

Item	Unit	Quantity	Rate		Cost × 1,000Baht			Remarks
			F.C.	L.C.	F.C.	L.C.	Total	
<b>1 River Diversion Works</b>								
1-1 Temporary Works	%	"1-2 (11)"×5%	5%	5%	3,142	1,515	4,657	
1-2 Direct Construction Cost								
(1) Tunnel Excavation	m <sup>3</sup>	15,000	1,150	230	17,250	3,450	20,700	
(2) Steel Support	ton	220	22,000	2,000	4,840	440	5,280	
(3) Tunnel Concrete	m <sup>3</sup>	4,000	1,470	780	5,880	3,120	9,000	
(4) Steel Liner	ton	610	36,000	27,000	21,960	16,470	38,430	
(5) Plug Concrete	m <sup>3</sup>	1,500	1,172	959	1,757	1,438	3,195	
(6) Form works	m <sup>2</sup>	7,200	104	401	749	2,887	3,636	
(7) Reinforced Bar	ton	40	20,691	2,739	828	110	938	
(8) Curtain Grout	m	400	2,990	430	1,196	172	1,368	
(9) Consolidation Grout	m	1,800	2,990	430	5,382	774	6,156	
(10) Miscellaneous	%	5			2,992	1,443	4,435	
(11) Subtotal ("1"+"10")					62,834	30,304	93,138	
1-3 Subtotal ("1-1"+"1-2")					65,976	31,819	97,795	
1-4 Overhead Cost ("1-3"×10%)	%		10%	10%	6,598	3,182	9,780	
1-5 Subtotal ("1-3"+"1-4")					72,574	35,001	107,575	
<b>2 Intake Works</b>								
2-1 Temporary Works	%	"2-2 (17)"×5%	5%	5%	3,970	1,787	5,757	
2-2 Direct Construction Cost								
(1) Site Clearing	ha	1.1	-	34,400	-	38	38	
(2) Stripping	m <sup>3</sup>	6,000	61	11	366	66	432	
(3) Excavation, Common	m <sup>3</sup>	17,000	62	11	1,054	187	1,241	
(4) Excavation, Weathered Rock	m <sup>3</sup>	23,000	100	16	2,300	368	2,668	
(5) Excavation, Rock	m <sup>3</sup>	29,000	238	30	6,902	870	7,772	
(6) Fill & Backfill	m <sup>3</sup>	6,000	54	13	324	78	402	
(7) Plain Concrete	m <sup>3</sup>	7,500	1,393	670	10,448	5,025	15,473	
(8) Structure Concrete	m <sup>3</sup>	14,000	1,529	972	21,406	13,608	35,014	
(9) Form works	m <sup>2</sup>	12,000	104	401	1,248	4,812	6,060	
(10) Reinforced Bar	ton	1,200	20,691	2,739	24,829	3,287	28,116	
(11) Closure Gate	ton	23	60,000	40,000	1,380	920	2,300	
(12) Intake Gate	ton	30	90,000	60,000	2,700	1,800	4,500	
(13) Intake Trash rack	ton	75	18,000	12,000	1,350	900	2,250	
(14) Intake Stoplog	ton	22	60,000	40,000	1,320	880	2,200	
(15) Control House	m <sup>2</sup>	150	-	8,000	-	1,200	1,200	
(16) Miscellaneous	%	5			3,781	1,702	5,483	
(17) Subtotal ("1"+"16")					79,408	35,741	115,149	
2-3 Subtotal ("2-1"+"2-2")					83,378	37,528	120,906	
2-4 Overhead Cost ("2-3"×10%)	%		10%	10%	8,338	3,753	12,091	
2-5 Subtotal ("2-3"+"2-4")					91,716	41,281	132,997	

Table B,Q-11 Construction Cost of Yao Dam &amp; Yot and Yao River Training

(2/5)

Item	Unit	Quantity	Rate		Cost × 1,000Baht			Remarks
			F.C.	L.C.	F.C.	L.C.	Total	
<b>3 Outlet Works</b>								
3-1 Temporary Works	%	*3-2(15)*5%	5%	5%	2,908	1,194	4,102	
3-2 Direct Construction Cost								
(1) Site Clearing	ha	2	-	34,400	-	69	69	
(2) Stripping	m <sup>3</sup>	10,000	61	11	610	110	720	
(3) Excavation, Common	m <sup>3</sup>	34,000	62	11	2,108	374	2,482	
(4) Excavation, Weathered Rock	m <sup>3</sup>	14,000	100	16	1,400	224	1,624	
(5) Plain Concrete	m <sup>3</sup>	2,800	1,393	670	3,900	1,876	5,776	
(6) Structure Concrete	m <sup>3</sup>	11,000	1,529	972	16,819	10,692	27,511	
(7) Form works	m <sup>2</sup>	8,500	104	401	884	3,409	4,293	
(8) Reinforced Bar	ton	800	20,691	2,739	16,553	2,191	18,744	
(9) Fixed Roller Gate	ton	30	90,000	60,000	2,700	1,800	4,500	
(10) Stoplog	ton	22	60,000	40,000	1,320	880	2,200	
(11) Hollow Jet Valve 2,000 mm	No.	1	6,300,000	-	6,300	-	6,300	
(12) Guard Valve 1,000 mm	No.	1	2,800,000	-	2,800	-	2,800	
(13) Control House	m <sup>2</sup>	140	-	8,000	-	1,120	1,120	
(14) Miscellaneous	%	5			2,770	1,137	3,907	
(15) Subtotal ("(1)"+"~"+"(14)")					58,164	23,882	82,046	
3-3 Subtotal ("3-1"+"3-2")					61,072	25,076	86,148	
3-4 Overhead Cost ("3-3"×10%)	%		10%	10%	6,107	2,508	8,615	
3-5 Subtotal ("3-3"+"3-4")					67,179	27,584	94,763	
<b>4 Cofferdam</b>								
4-1 Temporary Works	%	*4-2(10)*5%	5%	5%	1,127	658	1,785	
4-2 Direct Construction Cost								
(1) Site Clearing	ha	1	-	34,400	-	34	34	
(2) Stripping	m <sup>3</sup>	6,000	61	11	366	66	432	
(3) Excavation, Common	m <sup>3</sup>	29,000	62	11	1,798	319	2,117	
(4) Excavation, Weathered Rock	m <sup>3</sup>	12,000	100	16	1,200	192	1,392	
(5) Embankment, Core	m <sup>3</sup>	39,000	123	20	4,797	780	5,577	
(6) Embankment Filter	m <sup>3</sup>	36,000	72	234	2,592	8,424	11,016	
(7) Embankment Rock	m <sup>3</sup>	150,000	63	16	9,450	2,400	11,850	
(8) Embankment Riprap	m <sup>3</sup>	20,000	63	16	1,260	320	1,580	
(9) Miscellaneous	%	5			1,073	627	1,700	
(10) Subtotal ("(1)"+"~"+"(9)")					22,536	13,162	35,698	
4-3 Subtotal ("4-1"+"4-2")					23,663	13,820	37,483	
4-4 Overhead Cost ("4-3"×10%)	%		10%	10%	2,366	1,382	3,748	
4-5 Subtotal ("4-3"+"4-4")					26,029	15,202	41,231	

Table B,Q-11 Construction Cost of Yao Dam &amp; Yot and Yao River Training

(3/5)

Item	Unit	Quantity	Rate		Cost × 1,000Baht			Remarks
			F.C.	L.C.	F.C.	L.C.	Total	
5 Main Dam								
5-1 Temporary Works	%	*5-2 (13)*×5%	5%	5%	5,486	1,914	7,400	
5-2 Direct Construction Cost								
(1) Site Clearing	ha	6	-	34,400	-	206	206	
(2) Stripping	m³	31,000	61	11	1,891	341	2,232	
(3) Excavation, Common	m³	84,000	62	11	5,208	924	6,132	
(4) Excavation Weathered Rock	m³	36,000	100	16	3,600	576	4,176	
(5) Embankment, Core	m³	95,000	123	20	11,685	1,900	13,585	
(6) Embankment Filter	m³	85,000	72	234	6,120	19,890	26,010	
(7) Embankment Random	m³	260,000	15	5	3,900	1,300	5,200	
(8) Embankment Rock	m³	250,000	13	5	3,250	1,250	4,500	
(9) Embankment Riprap	m³	25,000	63	16	1,575	400	1,975	
(10) Curtain Grout	m	18,000	2,990	430	53,820	7,740	61,560	
(11) Blanket Grout	m	4,500	2,990	430	13,455	1,935	15,390	
(12) Miscellaneous	%	5			5,225	1,823	7,048	
(13) Subtotal ("(1)"+"--"(12)" )					109,729	38,285	148,014	
5-3 Subtotal ("5-1"+"5-2")					115,215	40,199	155,414	
5-4 Overhead Cost ("5-3"×10%)	%		10%	10%	11,522	4,020	15,542	
5-5 Subtotal ("5-3"+"5-4")					126,737	44,219	170,956	
6 Spillway								
6-1 Temporary Works	%	*6-2 (13)*×5%	5%	5%	16,367	5,450	21,817	
6-2 Direct Construction Cost								
(1) Site Clearing	ha	6	-	34,400	-	206	206	
(2) Stripping	m³	28,000	61	11	1,708	308	2,016	
(3) Excavation, Common	m³	475,000	68	12	32,300	5,700	38,000	
(4) Excavation weathered Rock	m³	285,000	107	17	30,495	4,845	35,340	
(5) Excavation Rock	m³	190,000	246	32	46,740	6,080	52,820	
(6) Backfill	m³	21,000	54	13	1,134	273	1,407	
(7) Plain Concrete	m³	43,000	1,370	666	58,910	28,638	87,548	
(8) Structure Concrete	m³	36,000	1,529	972	55,044	34,992	90,036	
(9) Form work	m²	29,000	104	401	3,016	11,629	14,645	
(10) Reinforced Bar	ton	3,000	20,691	2,739	62,073	8,217	70,290	
(11) Curtain Grout	m	6,800	2,990	430	20,332	2,924	23,256	
(12) Miscellaneous	%	5			15,588	5,191	20,779	
(13) Subtotal ("(1)"+"--"(12)" )					327,340	109,003	436,343	
6-3 Subtotal ("6-1"+"6-2")					343,707	114,453	458,160	
6-4 Overhead Cost ("6-3"×10%)	%		10%	10%	34,371	11,445	45,816	
6-5 Subtotal ("6-3"+"6-4")					378,078	125,898	503,976	

Table B,Q-11 Construction Cost of Yao Dam &amp; Yot and Yao River Training

(4/5)

Item	Unit	Quantity	Rate		Cost × 1,000 Baht			Remarks
			F.C.	L.C.	F.C.	L.C.	Total	
<b>7 Control House Yard</b>								
7-1 Temporary Works	%	7-2 (10) × 5%	5%	5%	1,313	709	2,022	
7-2 Direct Construction Cost								
(1) Site Clearing	ha	3	-	34,400	-	103	103	
(2) Stripping	m <sup>3</sup>	15,000	61	11	915	165	1,080	
(3) Excavation, Common	m <sup>3</sup>	144,000	68	12	9,792	1,728	11,520	
(4) Excavation Weathered Rock	m <sup>3</sup>	110,000	107	17	11,770	1,870	13,640	
(5) Backfill	m <sup>3</sup>	2,000	54	13	108	26	134	
(6) Plain Concrete	m <sup>3</sup>	1,500	1,370	666	2,055	999	3,054	
(7) Form work	m <sup>2</sup>	3,500	104	401	364	1,404	1,768	
(8) Control House	m <sup>2</sup>	900	-	8,000	-	7,200	7,200	
(9) Miscellaneous	%	5			1,250	675	1,925	
(10) Subtotal ("(1)"+"(9)")					26,254	14,170	40,424	
7-3 Subtotal ("7-1"+"7-2")					27,567	14,879	42,446	
7-4 Overhead Cost ("7-3"×10%)	%		10%	10%	2,757	1,488	4,245	
7-5 Subtotal ("7-3"+"7-4")					30,324	16,367	46,691	
<b>8 Yot River Training</b>								
8-1 Temporary Works	%	8-2 (7) × 5%	5%	5%	3,909	758	4,667	
8-2 Direct Construction Cost								
(1) Site Clearing	ha	13	-	34,400	-	447	447	
(2) Excavation, Common	m <sup>3</sup>	729,000	61	7	44,469	5,103	49,572	
(3) Excavation, Weathered Rock	m <sup>3</sup>	238,000	100	16	23,800	3,808	27,608	
(4) Plain Concrete	m <sup>3</sup>	4,000	1,393	670	5,572	2,680	8,252	
(5) Form work	m <sup>2</sup>	6,000	104	401	624	2,406	3,030	
(6) Miscellaneous	%	5			3,723	722	4,445	
(7) Subtotal ("(1)"+"(6)")					78,188	15,166	93,354	
8-3 Subtotal ("8-1"+"8-2")					82,097	15,924	98,021	
8-4 Overhead Cost ("8-3"×10%)	%		10%	10%	8,210	1,592	9,802	
8-5 Subtotal ("8-3"+"8-4")					90,307	17,516	107,823	
<b>9 Flood Protection Dike</b>								
9-1 Temporary Works	%	9-2 (6) × 5%	5%	5%	4,167	1,343	5,510	
9-2 Direct Construction Cost								
(1) Site Clearing	ha	31	-	34,400	-	1,066	1,066	
(2) Stripping	m <sup>3</sup>	156,000	53	6	8,268	936	9,204	
(3) Fill	m <sup>3</sup>	578,000	123	20	71,094	11,560	82,654	
(4) Sodding	ha	37	-	325,000	-	12,025	12,025	
(5) Miscellaneous	%	5			3,968	1,279	5,247	
(6) Subtotal ("(1)"+"(5)")					83,330	26,866	110,196	
9-3 Subtotal ("9-1"+"9-2")					87,497	28,209	115,706	
9-4 Overhead Cost ("9-3"×10%)	%		10%	10%	8,750	2,821	11,571	
9-5 Subtotal ("9-3"+"9-4")					96,247	31,030	127,277	

Table B,Q-11 Construction Cost of Yao Dam &amp; Yot and Yao River Training

(5/5)

Item	Unit	Quantity	Rate		Cost × 1,000Baht			Remarks
			F.C.	L.C.	F.C.	L.C.	Total	
<b>10 River Improvement</b>								
10-1 Temporary Works	%	10-2 (16) × 5%	5%	5%	8,468	11,956	20,424	
10-2 Direct Construction Cost								
(1) Site Clearing	ha	107	-	34,400	-	3,681	3,681	
(2) Stripping	m <sup>3</sup>	534,000	53	6	28,302	3,204	31,506	
(3) River Channel Excavation	m <sup>3</sup>	646,000	62	11	40,052	7,106	47,158	
(4) Fill	m <sup>3</sup>	1,082,000	48	6	51,936	6,492	58,428	
(5) Gabion Mattress	m <sup>3</sup>	178,000	-	775	-	137,950	137,950	
(6) Approach Step	No.	58	25,000	25,000	1,450	1,450	2,900	
(7) Drainage Sluice	No.	54	-	50,000	-	2,700	2,700	
(8) Consolidation Sill	No.	8	1,700,000	1,700,000	13,600	13,600	27,200	
(9) Ground Sill	No.	5	250,000	250,000	1,250	1,250	2,500	
(10) Road Bridge L = 85 m.	No.	4	2,066,000	4,820,000	8,264	19,280	27,544	
(11) Road Bridge L = 60 m.	No.	1	1,458,000	3,402,000	1,458	3,402	4,860	
(12) Road Bridge L = 50 m.	No.	3	1,215,000	2,835,000	3,645	8,505	12,150	
(13) Road Bridge L = 40 m.	No.	6	972,000	2,268,000	5,832	13,608	19,440	
(14) Access Road	m	11,000	500	500	5,500	5,500	11,000	
(15) Miscellaneous	%	5			8,064	11,386	19,450	
(16) Subtotal ("1" + ... + "15")					169,353	239,114	408,467	
10-3 Subtotal ("10-1" + "10-2")					177,821	251,070	428,891	
10-4 Overhead Cost ("10-3" × 10%)	%		10%	10%	17,782	25,107	42,889	
10-5 Subtotal ("10-3" + "10-4")					195,603	276,177	471,780	
11 Sub-Total ("1" + ... + "10")					1,175,000	630,000	1,805,000	
12 Taxes ("11" × 7%)	7%		7%	7%	82,000	44,000	126,000	
13 Total Cost ("11" + "12")					1,257,000	674,000	1,931,000	× 1,000Baht