Back Data of Table B,Q

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

Back Data Kok-Ing No.1 Tunnel L = 3,046.99 m (1,000 Baht) (1/2)

Item		Unit	Quantity	Rate (Baht/m)		Cost (1,000Baht)			Remarks
				F.C.	L.C.	F.C.	L.C.	Total	
1	Common Temporary Works	L.S.	"2-7"x5%	5%	5%	32,671	6,949	39,620	
2	Direct Construction Cost								
	2-1 Excavation								
	Grade B	m	-	-	-	-	-	-	
	C1	m	50.00	66,170	4,271	3,309	214	3,523	
	C2	m	440.00	53,687	4,050	23,622	1,782	25,404	
	D1	m	460.00	45,637	3,953	20,993	1,818	22,811	
	D2	m	560.00	37,147	3,855	20,802	2,159	22,961	
	E1	m	530.00	39,451	4,125	20,909	2,186	23,095	
	E2	m	1,006.99	39,961	4,214	40,240	4,243	44,483	
	Subtotal		3,046.99			129,875	12,402	142,277	
	2-2 Shotcrete								
	Grade B	m	-	-	-	-	-	-	
	C1	m	50.00	18,878	3,696	944	185	1,129	
	C2	m	440.00	19,859	3,719	8,738	1,636	10,374	
	D1	m	460.00	26,128	5,618	12,019	2,584	14,603	
	D2	m	560.00	31,884	6,266	17,855	3,509	21,364	
	E1	m	530.00	32,086	6,311	17,006	3,345	20,351	
	E2	m	1,006.99	40,709	7,887	40,994	7,942	48,936	
	Subtotal		3,046.99			97,556	19,201	116,757	
	2-3 Rock Bolts								
	Grade B	m	-	-	-	-	-	-	
	C1	m	50.00	15,889	4,599	794	230	1,024	
	C2	m	440.00	19,867	5,318	8,741	2,340	11,081	
	D1	m	460.00	38,744	10,935	17,822	5,030	22,852	
	D2	m	560.00	38,744	10,935	21,697	6,124	27,821	
	E1	m	530.00	38,744	10,935	20,534	5,796	26,330	
	E2	m	1,006.99	49,232	13,851	49,576	13,948	63,524	
	Subtotal		3,046.99			119,164	33,468	152,632	
	2-4 Steel Support								
	Grade B	m	-	-	-	-	-	-	
	C1	m	50.00	-	-	-	-	-	
	C2	m	440.00	20,048	2,198	8,821	967	9,788	
	D1	m	460.00	42,127	4,514	19,378	2,076	21,454	
	D2	m	560.00	54,709	5,942	30,637	3,328	33,965	
	E1	m	530.00	70,037	7,645	37,120	4,052	41,172	
	E2	m	1,006.99	70,037	7,645	70,527	7,698	78,225	
	Subtotal		3,046.99			166,483	18,121	184,604	
	2-5 Concrete Lining								
	Grade B	m	-	-	-	-	-	-	
	C1	m	50.00	28,535	11,026	1,427	551	1,978	
	C2	m	440.00	28,535	11,026	12,555	4,851	17,406	
	D1	m	460.00	31,659	13,340	14,563	6,136	20,699	
	D2	m	560.00	45,202	16,462	25,313	9,219	34,532	
	E1	m	530.00	50,206	19,049	26,609	10,096	36,705	
	E2	m	1,006.99	58,556	20,546	58,965	20,690	79,655	
	Subtotal		3,046.99			139,432	51,543	190,975	
	2-6 Drain Pipe								
	Grade B	m	-	-	-	-	-	-	
	C1	m	50.00	287	1,338	14	67	81	
	C2	m	440.00	287	1,338	126	589	715	
	D1	m	460.00	287	1,338	132	615	747	
	D2	m	560.00	287	1,338	161	749	910	
	E1	m	530.00	304	1,451	161	769	930	
	E2	m	1,006.99	304	1,451	306	1,461	1,767	
	Subtotal		3,046.99			900	4,250	5,150	
	2-7 Subtotal ("2-1"+~+"2-6")					653,410	138,985	792,395	
3	Subtotal ("1"+"2")					686,081	145,934	832,015	

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

Back Data

Kok-Ing No.1 Tunnel L = 3,046.99 m

(1,000 Baht) (2/2)

	Item	Unit	Quantity	Rate (Baht/m) F.C.	Rate (Baht/m) L.C.	Cost (1,000Baht) F.C.	Cost (1,000Baht) L.C.	Cost (1,000Baht) Total	Remarks
4	Temporary Works								
	4-1 Temporary Works of Inside Tunnel								
	(1) Electric Charge of Lighting			L.S.	L.S.	-	31,788	31,788	
	(2) Electric Charge of Ventilation			L.S.	L.S.	-	8,514	8,514	
	(3) Installation & Dismantling of Air Pipe for Ventilation			L.S.	L.S.	2,086	317	2,403	
	(4) Electric Charge of Fan			L.S.	L.S.	-	12,489	12,489	
	(5) Installation & Dismantling of Air Pipe for Fan			L.S.	L.S.	5,444	101	5,545	
	(6) Electric Charge of Water Supply Pump			L.S.	L.S.	-	567	567	
	(7) Installation & Dismantling of Water Supply Pipe			L.S.	L.S.	868	184	1,052	
	(8) Electric Charge of Drainage Pump			L.S.	L.S.	-	2,553	2,553	
	(9) Electric Charge of Water Treatment Plant for Drainage System			L.S.		-	1,419	1,419	
	(10) Installation & Dismantling of Drainage Pipe			L.S.	L.S.	593	154	747	
	(11) Operation Cost for Water Treatment Plant			L.S.	L.S.	2,211	519	2,730	
	(12) Transportation of Sludge from Water Treatment Plant			L.S.	L.S.	1,144	280	1,424	
	Subtotal ("(1)"+⋯+"(12)")					12,346	58,885	71,231	
	4-2 Temporary Works of Outside Tunnel								
	(1) Receiving & Distribution Facilities for Electric Supply			L.S.	L.S.	10,729	484	11,213	
	(2) Installation & Dismantling of Water Treatment Plant for Drainage Facilities					20,238	33	20,271	
	(3) Transportation Cost of Equipment			L.S.	L.S.	377	58	435	
	(4) Construction Cost of Tunnel Portal			L.S.	L.S.	898	671	1,569	
	(5) High Tension Power Line	km	3.75	900,000	100,000	3,375	375	3,750	1×10^6Baht/km
	(6) Access Road	m	3,100	2,660	1,140	8,246	3,534	11,780	3.8×10^3Baht/m
	(7) Muck Disposal Treatment	m3	255,000	28	12	7,140	3,060	10,200	40Baht/m3
	(8) Others	L.S.		5.0%	5.0%	2,550	411	2,961	"(1)+⋯+(7)"×5%
	Subtotal ("(1)"+⋯+"(8)")					53,553	8,626	62,179	
	4-3 Subtotal ("4-1"+"4-2")					65,899	67,511	133,410	
5	Subtotal ("3"+"4")					751,980	213,445	965,425	
6	Overhead Cost ("5"×10%)	%		10%	10%	75,198	21,345	96,543	
7	Total Cost ("5"+"6")					827,178	234,790	1,061,968	

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

Back Data | Kok-Ing No.2 Tunnel | L = 5,415.02 m | (1,000 Baht) | (1/2)

	Item		Unit	Quantity	Rate (Baht/m)		Cost (1,000Baht)			Remarks
					F.C.	L.C.	F.C.	L.C.	Total	
1	Common Temporary Works		L.S.	"2-7"×5%	5%	5%	57,344	12,135	69,479	
2	Direct Construction Cost									
	2-1 Excavation									
	Grade	B	m	-	-	-	-	-	-	
		C1	m	480.00	66,170	4,271	31,762	2,050	33,812	
		C2	m	790.00	53,687	4,050	42,413	3,200	45,613	
		D1	m	620.00	45,637	3,953	28,295	2,451	30,746	
		D2	m	660.00	37,147	3,855	24,517	2,544	27,061	
		E1	m	750.00	39,451	4,125	29,588	3,094	32,682	
		E2	m	2,115.02	39,961	4,214	84,518	8,913	93,431	
	Subtotal			5,415.02			241,093	22,252	263,345	
	2-2 Shotcrete									
	Grade	B	m	-	-	-	-	-	-	
		C1	m	480.00	18,878	3,696	9,061	1,774	10,835	
		C2	m	790.00	19,859	3,719	15,689	2,938	18,627	
		D1	m	620.00	26,128	5,618	16,199	3,483	19,682	
		D2	m	660.00	31,884	6,266	21,043	4,136	25,179	
		E1	m	750.00	32,086	6,311	24,065	4,733	28,798	
		E2	m	2,115.02	40,709	7,887	86,100	16,681	102,781	
	Subtotal			5,415.02			172,157	33,745	205,902	
	2-3 Rock Bolts									
	Grade	B	m	-	-	-	-	-	-	
		C1	m	480.00	15,889	4,599	7,627	2,208	9,835	
		C2	m	790.00	19,867	5,318	15,695	4,201	19,896	
		D1	m	620.00	38,744	10,935	24,021	6,780	30,801	
		D2	m	660.00	38,744	10,935	25,571	7,217	32,788	
		E1	m	750.00	38,744	10,935	29,058	8,201	37,259	
		E2	m	2,115.02	49,232	13,851	104,127	29,295	133,422	
	Subtotal			5,415.02			206,099	57,902	264,001	
	2-4 Steel Support									
	Grade	B	m	-	-	-	-	-	-	
		C1	m	480.00	-	-	-	-	-	
		C2	m	790.00	20,048	2,198	15,838	1,736	17,574	
		D1	m	620.00	42,127	4,514	26,119	2,799	28,918	
		D2	m	660.00	54,709	5,942	36,108	3,922	40,030	
		E1	m	750.00	70,037	7,645	52,528	5,734	58,262	
		E2	m	2,115.02	70,037	7,645	148,130	16,169	164,299	
	Subtotal			5,415.02			278,723	30,360	309,083	
	2-5 Concrete Lining									
	Grade	B	m	-	-	-	-	-	-	
		C1	m	480.00	28,535	11,026	13,697	5,292	18,989	
		C2	m	790.00	28,535	11,026	22,543	8,711	31,254	
		D1	m	620.00	31,659	13,340	19,629	8,271	27,900	
		D2	m	660.00	45,202	16,462	29,833	10,865	40,698	
		E1	m	750.00	50,206	19,049	37,655	14,287	51,942	
		E2	m	2,115.02	58,556	20,546	123,847	43,455	167,302	
	Subtotal			5,415.02			247,204	90,881	338,085	
	2-6 Drain Pipe									
	Grade	B	m	-	-	-	-	-	-	
		C1	m	480.00	287	1,338	138	642	780	
		C2	m	790.00	287	1,338	227	1,057	1,284	
		D1	m	620.00	287	1,338	178	830	1,008	
		D2	m	660.00	287	1,338	189	883	1,072	
		E1	m	750.00	304	1,451	228	1,088	1,316	
		E2	m	2,115.02	304	1,451	643	3,069	3,712	
	Subtotal			5,415.02			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	

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

Back Data Kok-Ing No.2 Tunnel L = 5,415.02 m (1,000 Baht) (2/2)

	Item	Unit	Quantity	Rate (Baht/m) F.C.	Rate (Baht/m) L.C.	Cost (1,000Baht) F.C.	Cost (1,000Baht) L.C.	Cost (1,000Baht) Total	Remarks
4	Temporary Works								
	4-1 Temporary Works of Inside Tunnel								
	(1) Electric Charge of Lighting			L.S.	L.S.	-	47,094	47,094	
	(2) Electric Charge of Ventilation			L.S.	L.S.	-	12,615	12,615	
	(3) Installation & Dismantling of Air Pipe for Ventilation			L.S.	L.S.	3,651	554	4,205	
	(4) Electric Charge of Fan			L.S.	L.S.	-	18,501	18,501	
	(5) Installation & Dismantling of Air Pipe for Fan			L.S.	L.S.	9,675	179	9,854	
	(6) Electric Charge of Water Supply Pump			L.S.	L.S.	-	840	840	
	(7) Installation & Dismantling of Water Supply Pipe			L.S.	L.S.	1,481	315	1,796	
	(8) Electric Charge of Drainage Pump			L.S.	L.S.	-	4,542	4,542	
	(9) Electric Charge of Water Treatment Plant for Drainage System				L.S.	-	2,523	2,523	
	(10) Installation & Dismantling of Drainage Pipe			L.S.	L.S.	1,012	263	1,275	
	(11) Operation Cost for Water Treatment Plant			L.S.	L.S.	3,930	921	4,851	
	(12) Transportation of Sludge from Water Treatment Plant			L.S.	L.S.	2,030	496	2,526	
	Subtotal ("(1)"+—+"(12)")					**21,779**	**88,843**	**110,622**	
	4-2 Temporary Works of Outside Tunnel								
	(1) Receiving & Distribution Facilities for Electric Supply			L.S.	L.S.	13,603	801	14,404	
	(2) Installation & Dismantling of Water Treatment Plant for Drainage Facilities					20,238	33	20,271	
	(3) Transportation Cost of Equipment			L.S.	L.S.	377	58	435	
	(4) Construction Cost of Tunnel Portal			L.S.	L.S.	898	671	1,569	
	(5) High Tension Power Line	km	7.62	900,000	100,000	6,858	762	7,620	1×10^6Baht/km
	(6) Access Road	m	900	2,660	1,140	2,394	1,026	3,420	3.8×10^3Baht/m
	(7) Muck Disposal Treatment	m3	452,000	28	12	12,656	5,424	18,080	40Baht/m3
	(8) Others	L.S.		5.0%	5.0%	2,851	439	3,290	"(1)+—+(7)"×5%
	Subtotal ("(1)"+—+"(8)")					**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	Total Cost ("5"+"6")					**1,414,465**	**388,191**	**1,802,656**	

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

Back Data | Ing-Yot No.1 Tunnel | L = 2,008.213 m | (1,000 Baht) | (1/2)

	Item		Unit	Quantity	Rate (Baht/m)		Cost (1,000Baht)			Remarks
					F.C.	L.C.	F.C.	L.C.	Total	
1	Common Temporary Works		L.S.	"2-7"×5%	5%	5%	23,385	4,960	28,345	
2	Direct Construction Cost									
	2-1 Excavation									
	Grade	B	m	-	-	-	-	-	-	
		C1	m	-	78,435	4,920	-	-	-	
		C2	m	100.000	63,482	4,511	6,348	451	6,799	
		D1	m	400.000	55,185	4,452	22,074	1,781	23,855	
		D2	m	850.000	45,035	4,381	38,280	3,724	42,004	
		E1	m	350.000	47,480	4,658	16,618	1,630	18,248	
		E2	m	308.213	48,199	4,678	14,856	1,442	16,298	
	Subtotal			2,008.213			98,176	9,028	107,204	
	2-2 Shotcrete									
	Grade	B	m	-	-	-	-	-	-	
		C1	m	-	20,175	3,855	-	-	-	
		C2	m	100.000	21,594	4,180	2,159	418	2,577	
		D1	m	400.000	28,091	5,936	11,236	2,374	13,610	
		D2	m	850.000	35,527	6,696	30,198	5,692	35,890	
		E1	m	350.000	35,929	6,796	12,575	2,379	14,954	
		E2	m	308.213	44,454	8,406	13,701	2,591	16,292	
	Subtotal			2,008.213			69,869	13,454	83,323	
	2-3 Rock Bolts									
	Grade	B	m	-	-	-	-	-	-	
		C1	m	-	17,141	4,846	-	-	-	
		C2	m	100.000	21,306	5,593	2,131	559	2,690	
		D1	m	400.000	41,119	11,812	16,448	4,725	21,173	
		D2	m	850.000	41,119	11,812	34,951	10,040	44,991	
		E1	m	350.000	41,119	11,812	14,392	4,134	18,526	
		E2	m	308.213	51,749	14,202	15,950	4,377	20,327	
	Subtotal			2,008.213			83,872	23,835	107,707	
	2-4 Steel Support									
	Grade	B	m	-	-	-	-	-	-	
		C1	m	-	-	-	-	-	-	
		C2	m	100.000	24,255	2,667	2,426	267	2,693	
		D1	m	400.000	42,754	4,584	17,102	1,834	18,936	
		D2	m	850.000	56,295	6,065	47,851	5,155	53,006	
		E1	m	350.000	76,672	8,328	26,835	2,915	29,750	
		E2	m	308.213	76,672	8,328	23,631	2,567	26,198	
	Subtotal			2,008.213			117,845	12,738	130,583	
	2-5 Concrete Lining									
	Grade	B	m	-	-	-	-	-	-	
		C1	m	-	30,660	12,092	-	-	-	
		C2	m	100.000	30,660	12,092	3,066	1,209	4,275	
		D1	m	400.000	34,175	14,712	13,670	5,885	19,555	
		D2	m	850.000	48,900	18,118	41,565	15,400	56,965	
		E1	m	350.000	55,027	20,885	19,259	7,310	26,569	
		E2	m	308.213	64,087	22,510	19,752	6,938	26,690	
	Subtotal			2,008.213			97,312	36,742	134,054	
	2-6 Drain Pipe									
	Grade	B	m	-	-	-	-	-	-	
		C1	m	-	304	1,649	-	-	-	
		C2	m	100.000	304	1,649	30	165	195	
		D1	m	400.000	304	1,649	122	660	782	
		D2	m	850.000	304	1,649	258	1,402	1,660	
		E1	m	350.000	320	1,778	112	622	734	
		E2	m	308.213	320	1,778	99	548	647	
	Subtotal			2,008.213			621	3,397	4,018	
	2-7 Subtotal ("2-1"+~+"2-6")						467,695	99,194	566,889	
3	Subtotal ("1"+"2")						491,080	104,154	595,234	

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

Back Data Ing-Yot No.1 Tunnel L = 2,008.213 m (2/2)

(1,000 Baht)

	Item	Unit	Quantity	Rate (Baht/m)		Cost (1,000Baht)			Remarks
				F.C.	L.C.	F.C.	L.C.	Total	
4	Temporary Works								
	4-1 Temporary Works of Inside Tunnel								
	(1) Electric Charge of Lighting			L.S.	L.S.	-	21,192	21,192	
	(2) Electric Charge of Ventilation			L.S.	L.S.	-	5,676	5,676	
	(3) Installation & Dismantling of Air Pipe for Ventilation			L.S.	L.S.	1,434	218	1,652	
	(4) Electric Charge of Fan			L.S.	L.S.	-	8,325	8,325	
	(5) Installation & Dismantling of Air Pipe for Fan			L.S.	L.S.	3,588	66	3,654	
	(6) Electric Charge of Water Supply Pump			L.S.	L.S.	-	378	378	
	(7) Installation & Dismantling of Water Supply Pipe			L.S.	L.S.	598	127	725	
	(8) Electric Charge of Drainage Pump			L.S.	L.S.	-	1,704	1,704	
	(9) Electric Charge of Water Treatment Plant for Drainage System			L.S.	L.S.	-	945	945	
	(10) Installation & Dismantling of Drainage Pipe			L.S.	L.S.	409	106	515	
	(11) Operation Cost for Water Treatment Plant			L.S.	L.S.	1,457	342	1,799	
	(12) Transportation of Sludge from Water Treatment Plant			L.S.	L.S.	761	186	947	
	Subtotal ("(1)"+⋯+"(12)")					**8,247**	**39,265**	**47,512**	
	4-2 Temporary Works of Outside Tunnel								
	(1) Receiving & Distribution Facilities for Electric Supply			L.S.	L.S.	9,412	342	9,754	
	(2) Installation & Dismantling of Water Treatment Plant for Drainage Facilities					20,238	33	20,271	
	(3) Transportation Cost of Equipment			L.S.	L.S.	377	58	435	
	(4) Construction Cost of Tunnel Portal			L.S.	L.S.	898	671	1,569	
	(5) High Tension Power Line	km	0.50	900,000	100,000	450	50	500	1×10^6Baht/km
	(6) Access Road	m	1,000	2,660	1,140	2,660	1,140	3,800	3.8×10^3Baht/m
	(7) Muck Disposal Treatment	m3	195,000	28	12	5,460	2,340	7,800	40Baht/m3
	(8) Others	L.S.		5.0%	5.0%	1,975	232	2,207	"(1)+⋯+(7)"×5%
	Subtotal ("(1)"+⋯+"(8)")					**41,470**	**4,866**	**46,336**	
	4-3 Subtotal ("4-1"+"4-2")					**49,717**	**44,131**	**93,848**	
5	**Subtotal ("3"+"4")**					**540,797**	**148,285**	**689,082**	
6	**Overhead Cost ("5"×10%)**	%		10%	10%	**54,080**	**14,829**	**68,909**	
7	**Total Cost ("5"+"6")**					**594,877**	**163,114**	**757,991**	

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

Back Data

Ing-Yot No.2 Tunnel , Division 1 L=4,910.0 m

(1,000 Baht) (1/2)

	Item		Unit	Quantity	Rate (Baht/m)		Cost (1,000Baht)			Remarks
					F.C.	L.C.	F.C.	L.C.	Total	
1	Common Temporary Works		L.S.	"2-7"×5%	5%	5%	51,498	10,573	62,071	
2	Direct Construction Cost									
	2-1 Excavation									
	Grade	B	m	-	-	-	-	-	-	
		C1	m	220.0	78,435	4,920	17,256	1,082	18,338	
		C2	m	1,780.0	63,482	4,511	112,998	8,030	121,028	
		D1	m	440.0	55,185	4,452	24,281	1,959	26,240	
		D2	m	1,130.0	45,035	4,381	50,890	4,951	55,841	
		E1	m	620.0	47,480	4,658	29,438	2,888	32,326	
		E2	m	720.0	48,199	4,678	34,703	3,368	38,071	
	Subtotal			4,910.0			269,566	22,278	291,844	
	2-2 Shotcrete									
	Grade	B	m	-	-	-	-	-	-	
		C1	m	220.0	20,175	3,855	4,439	848	5,287	
		C2	m	1,780.0	21,594	4,180	38,437	7,440	45,877	
		D1	m	440.0	28,091	5,936	12,360	2,612	14,972	
		D2	m	1,130.0	35,527	6,696	40,146	7,566	47,712	
		E1	m	620.0	35,929	6,796	22,276	4,214	26,490	
		E2	m	720.0	44,454	8,406	32,007	6,052	38,059	
	Subtotal			4,910.0			149,665	28,732	178,397	
	2-3 Rock Bolts									
	Grade	B	m	-	-	-	-	-	-	
		C1	m	220.0	17,141	4,846	3,771	1,066	4,837	
		C2	m	1,780.0	21,306	5,593	37,925	9,956	47,881	
		D1	m	440.0	41,119	11,812	18,092	5,197	23,289	
		D2	m	1,130.0	41,119	11,812	46,464	13,348	59,812	
		E1	m	620.0	41,119	11,812	25,494	7,323	32,817	
		E2	m	720.0	51,749	14,202	37,259	10,225	47,484	
	Subtotal			4,910.0			169,005	47,115	216,120	
	2-4 Steel Support									
	Grade	B	m	-	-	-	-	-	-	
		C1	m	220.0	-	-	-	-	-	
		C2	m	1,780.0	24,255	2,667	43,174	4,747	47,921	
		D1	m	440.0	42,754	4,584	18,812	2,017	20,829	
		D2	m	1,130.0	56,295	6,065	63,613	6,853	70,466	
		E1	m	620.0	76,672	8,328	47,537	5,163	52,700	
		E2	m	720.0	76,672	8,328	55,204	5,996	61,200	
	Subtotal			4,910.0			228,340	24,776	253,116	
	2-5 Concrete Lining									
	Grade	B	m	-	-	-	-	-	-	
		C1	m	220.0	30,660	12,092	6,745	2,660	9,405	
		C2	m	1,780.0	30,660	12,092	54,575	21,524	76,099	
		D1	m	440.0	34,175	14,712	15,037	6,473	21,510	
		D2	m	1,130.0	48,900	18,118	55,257	20,473	75,730	
		E1	m	620.0	55,027	20,885	34,117	12,949	47,066	
		E2	m	720.0	64,087	22,510	46,143	16,207	62,350	
	Subtotal			4,910.0			211,874	80,286	292,160	
	2-6 Drain Pipe									
	Grade	B	m	-	-	-	-	-	-	
		C1	m	220.0	304	1,649	67	363	430	
		C2	m	1,780.0	304	1,649	541	2,935	3,476	
		D1	m	440.0	304	1,649	134	726	860	
		D2	m	1,130.0	304	1,649	344	1,863	2,207	
		E1	m	620.0	320	1,778	198	1,102	1,300	
		E2	m	720.0	320	1,778	230	1,280	1,510	
	Subtotal			4,910.0			1,514	8,269	9,783	
	2-7 Subtotal ("2-1"+~+"2-6")						1,029,964	211,456	1,241,420	
3	Subtotal ("1"+"2")						1,081,462	222,029	1,303,491	

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

Back Data

Ing-Yot No.2 Tunnel , Division 1 L=4,910.0 m

(1,000 Baht) (2/2)

	Item	Unit	Quantity	Rate (Baht/m)		Cost (1,000Baht)			Remarks
				F.C.	L.C.	F.C.	L.C.	Total	
4	Temporary Works								
	4-1 Temporary Works of Inside Tunnel								
	(1) Electric Charge of Lighting			L.S.	L.S.	-	51,213	51,213	
	(2) Electric Charge of Ventilation			L.S.	L.S.	-	13,719	13,719	
	(3) Installation & Dismantling of Air Pipe for Ventilation			L.S.	L.S.	3,325	505	3,830	
	(4) Electric Charge of Fan			L.S.	L.S.	-	20,121	20,121	
	(5) Installation & Dismantling of Air Pipe for Fan			L.S.	L.S.	8,764	162	8,926	
	(6) Electric Charge of Water Supply Pump			L.S.	L.S.	-	915	915	
	(7) Installation & Dismantling of Water Supply Pipe			L.S.	L.S.	1,349	287	1,636	
	(8) Electric Charge of Drainage Pump			L.S.	L.S.	-	4,116	4,116	
	(9) Electric Charge of Water Treatment Plant for Drainage System				L.S.	-	2,286	2,286	
	(10) Installation & Dismantling of Drainage Pipe			L.S.	L.S.	922	240	1,162	
	(11) Operation Cost for Water Treatment Plant			L.S.	L.S.	3,560	835	4,395	
	(12) Transportation of Sludge from Water Treatment Plant			L.S.	L.S.	1,839	450	2,289	
	Subtotal ("(1)"+⋯+"(12)")					19,759	94,849	114,608	
	4-2 Temporary Works of Outside Tunnel								
	(1) Receiving & Distribution Facilities for Electric Supply			L.S.	L.S.	12,983	732	13,715	
	(2) Installation & Dismantling of Water Treatment Plant for Drainage Facilities					20,238	33	20,271	
	(3) Transportation Cost of Equipment			L.S.	L.S.	377	58	435	
	(4) Construction Cost of Tunnel Portal			L.S.	L.S.	898	671	1,569	
	(5) High Tension Power Line	km	1.00	900,000	100,000	900	100	1,000	1x10^6Baht/km
	(6) Access Road	m	1,170	2,660	1,140	3,112	1,334	4,446	3.8x10^3Baht/m
	(7) Muck Disposal Treatment	m3	465,000	28	12	13,020	5,580	18,600	40Baht/m3
	(8) Others	L.S.		5.0%	5.0%	2,576	425	3,001	"(1)+⋯+(7)"x5%
	Subtotal ("(1)"+⋯+"(8)")					54,104	8,933	63,037	
	4-3 Subtotal ("4-1"+"4-2")					73,863	103,782	177,645	
5	Subtotal ("3"+"4")					1,155,325	325,811	1,481,136	
6	Overhead Cost ("5"x10%)	%		10%	10%	115,533	32,581	148,114	
7	Total Cost ("5"+"6")					1,270,858	358,392	1,629,250	

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

Back Data

Ing-Yot No.2 Tunnel Division 2 with Adit No.1 Div.2 L=4,550.0 m, Adit No.1 L=1,981.99 m

(1,000 Baht)

	Item		Unit	Quantity	Rate (Baht/m)		Cost (1,000Baht)			Remarks
					F.C.	L.C.	F.C.	L.C.	Total	
1	Common Temporary Works		L.S.	"2-3"x5%	5%	5%	55,733	11,172	66,905	
2	Direct Construction Cost									
	2-1 Main Tunnel : Div.2 L=4,550.0m									
	(1) Excavation									
	Grade	B	m	-	85,869	5,395	-	-	-	
		C1	m	1,350.0	79,900	5,054	107,865	6,823	114,688	
		C2	m	1,460.0	65,804	4,742	96,074	6,923	102,997	
		D1	m	1,020.0	55,185	4,452	56,289	4,541	60,830	
		D2	m	570.0	45,433	4,402	25,897	2,509	28,406	
		E1	m	150.0	47,934	4,671	7,190	701	7,891	
		E2	m	-	48,586	4,694	-	-	-	
	Subtotal			4,550.0			293,315	21,497	314,812	
	(2) Shotcrete									
	Grade	B	m	-	13,084	2,935	-	-	-	
		C1	m	1,350.0	20,433	3,867	27,585	5,220	32,805	
		C2	m	1,460.0	22,074	4,198	32,228	6,129	38,357	
		D1	m	1,020.0	28,464	5,976	29,033	6,096	35,129	
		D2	m	570.0	36,007	6,766	20,524	3,857	24,381	
		E1	m	150.0	36,649	6,876	5,497	1,031	6,528	
		E2	m	-	44,694	8,415	-	-	-	
	Subtotal			4,550.0			114,867	22,333	137,200	
	(3) Rock Bolts									
	Grade	B	m	-	13,615	3,707	-	-	-	
		C1	m	1,350.0	17,141	4,846	23,140	6,542	29,682	
		C2	m	1,460.0	21,306	5,593	31,107	8,166	39,273	
		D1	m	1,020.0	41,119	11,812	41,941	12,048	53,989	
		D2	m	570.0	41,119	11,812	23,438	6,733	30,171	
		E1	m	150.0	41,119	11,812	6,168	1,772	7,940	
		E2	m	-	51,749	14,202	-	-	-	
	Subtotal			4,550.0			125,794	35,261	161,055	
	(4) Steel Support									
	Grade	B	m	-	-	-	-	-	-	
		C1	m	1,350.0	-	-	-	-	-	
		C2	m	1,460.0	24,255	2,667	35,412	3,894	39,306	
		D1	m	1,020.0	42,754	4,584	43,609	4,676	48,285	
		D2	m	570.0	56,295	6,065	32,088	3,457	35,545	
		E1	m	150.0	76,672	8,328	11,501	1,249	12,750	
		E2	m	-	76,672	8,328	-	-	-	
	Subtotal			4,550.0			122,610	13,276	135,886	
	(5) Concrete Lining									
	Grade	B	m	-	30,438	11,997	-	-	-	
		C1	m	1,350.0	30,660	12,092	41,391	16,324	57,715	
		C2	m	1,460.0	30,660	12,092	44,764	17,654	62,418	
		D1	m	1,020.0	34,175	14,712	34,859	15,006	49,865	
		D2	m	570.0	48,900	18,118	27,873	10,327	38,200	
		E1	m	150.0	55,027	20,885	8,254	3,133	11,387	
		E2	m	-	64,087	22,510	-	-	-	
	Subtotal			4,550.0			157,141	62,444	219,585	
	(6) Drain Pipe									
	Grade	B	m	-	304	1,451	-	-	-	
		C1	m	1,350.0	304	1,451	410	1,959	2,369	
		C2	m	1,460.0	304	1,451	444	2,118	2,562	
		D1	m	1,020.0	304	1,451	310	1,480	1,790	
		D2	m	570.0	304	1,451	173	827	1,000	
		E1	m	150.0	320	1,564	48	235	283	
		E2	m	-	320	1,564	-	-	-	
	Subtotal			4,550.0			1,385	6,619	8,004	
	(7) Subtotal ("(1)"+ ~ +"(6)")						815,112	161,430	976,542	

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

Back Data

Ing-Yot No.2 Tunnel Division 2 with Adit No.1 Div.2 L=4,550.0 m, Adit No.1 L=1,981.99 m

(1,000 Baht)

Item		Unit	Quantity	Rate (Baht/m)		Cost (1,000Baht)			Remarks
				F.C.	L.C.	F.C.	L.C.	Total	
2-2 Adit No.1 L=1,981.99 m									
(1) Excavation									
Grade	B	m	-	48,834	3,075	-	-	-	
	C1	m	490.00	42,833	3,006	20,988	1,473	22,461	
	C2	m	260.00	34,774	2,628	9,041	683	9,724	
	D1	m	451.99	31,769	3,023	14,359	1,366	15,725	
	D2	m	80.00	26,929	3,006	2,154	240	2,394	
	E1	m	150.00	28,641	3,109	4,296	466	4,762	
	E2	m	550.00	28,179	2,950	15,498	1,623	17,121	
Subtotal			1,981.99			66,336	5,851	72,187	
(2) Shotcrete									
Grade	B	m	-	10,929	2,398	-	-	-	
	C1	m	490.00	15,531	2,913	7,610	1,427	9,037	
	C2	m	260.00	16,795	3,356	4,367	873	5,240	
	D1	m	451.99	22,450	4,377	10,147	1,978	12,125	
	D2	m	80.00	28,862	5,335	2,309	427	2,736	
	E1	m	150.00	28,487	5,376	4,273	806	5,079	
	E2	m	550.00	33,700	6,557	18,535	3,606	22,141	
Subtotal			1,981.99			47,241	9,117	56,358	
(3) Rock Bolts									
Grade	B	m	-	9,170	2,559	-	-	-	
	C1	m	490.00	12,696	3,698	6,221	1,812	8,033	
	C2	m	260.00	15,878	4,112	4,128	1,069	5,197	
	D1	m	451.99	31,959	9,367	14,445	4,234	18,679	
	D2	m	80.00	31,959	9,367	2,557	749	3,306	
	E1	m	150.00	31,959	9,367	4,794	1,405	6,199	
	E2	m	550.00	41,598	11,588	22,879	6,373	29,252	
Subtotal			1,981.99			55,024	15,642	70,666	
(4) Steel Support									
Grade	B	m	-	-	-	-	-	-	
	C1	m	490.00	-	-	-	-	-	
	C2	m	260.00	15,843	1,731	4,119	450	4,569	
	D1	m	451.99	36,412	3,954	16,458	1,787	18,245	
	D2	m	80.00	49,061	5,392	3,925	431	4,356	
	E1	m	150.00	59,408	6,542	8,911	981	9,892	
	E2	m	550.00	59,408	6,542	32,674	3,598	36,272	
Subtotal			1,981.99			66,087	7,247	73,334	
(5) Concrete Lining									
Grade	B	m	-	21,869	6,881	-	-	-	
	C1	m	490.00	22,214	6,881	10,885	3,372	14,257	
	C2	m	260.00	22,214	6,881	5,776	1,789	7,565	
	D1	m	451.99	28,024	11,141	12,667	5,036	17,703	
	D2	m	80.00	37,816	13,467	3,025	1,077	4,102	
	E1	m	150.00	41,451	15,200	6,218	2,280	8,498	
	E2	m	550.00	46,958	16,188	25,827	8,903	34,730	
Subtotal			1,981.99			64,398	22,457	86,855	
(6) Drain Pipe									
Grade	B	m	-	232	836	-	-	-	
	C1	m	490.00	232	836	114	410	524	
	C2	m	260.00	232	836	60	217	277	
	D1	m	451.99	232	836	105	378	483	
	D2	m	80.00	232	836	19	67	86	
	E1	m	150.00	244	904	37	136	173	
	E2	m	550.00	244	904	134	497	631	
Subtotal			1,981.99			469	1,705	2,174	
(7) Subtotal ("(1)"+~+"(6)")						**299,555**	**62,019**	**361,574**	
2-3 Subtotal ("2-1"+~+"2-2")						**1,114,667**	**223,449**	**1,338,116**	
3 Subtotal ("1"+"2")						**1,170,400**	**234,621**	**1,405,021**	

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

Back Data

Ing-Yot No.2 Tunnel Division 2 with Adit No.1 Div.2 L=4,550.0 m, Adit No.1 L=1,981.99 m

(1,000 Baht)

	Item	Unit	Quantity	Rate (Baht/m) F.C.	Rate (Baht/m) L.C.	Cost (1,000Baht) F.C.	Cost (1,000Baht) L.C.	Cost (1,000Baht) Total	Remarks
4	Temporary Works								
	4-1 Main Tunnel : Div.2 L=4,550.0m								
	(1) Temporary Works of Inside Tunnel								
	① Electric Charge of Lighting			L.S.	L.S.	-	42,237	42,237	
	② Electric Charge of Ventilation			L.S.	L.S.	-	11,313	11,313	
	③ Installation & Dismantling of Air Pipe for Ventilation			L.S.	L.S.	3,130	475	3,605	
	④ Electric Charge of Fan			L.S.	L.S.	-	16,593	16,593	
	⑤ Installation & Dismantling of Air Pipe for Fan			L.S.	L.S.	8,122	150	8,272	
	⑥ Electric Charge of Water Supply Pump			L.S.	L.S.	-	753	753	
	⑦ Installation & Dismantling of Water Supply Pipe			L.S.	L.S.	1,256	267	1,523	
	⑧ Electric Charge of Drainage Pump			L.S.	L.S.	-	3,879	3,879	
	⑨ Electric Charge of Water Treatment Plant for Drainage System				L.S.	-	2,154	2,154	
	⑩ Installation & Dismantling of Drainage Pipe			L.S.	L.S.	858	223	1,081	
	⑪ Operation Cost for Water Treatment Plant			L.S.	L.S.	3,299	774	4,073	
	⑫ Transportation of Sludge from Water Treatment Plant			L.S.	L.S.	1,300	318	1,618	
	Subtotal ("①"+⋯+"⑫")					17,965	79,136	97,101	
	(2) Temporary Works of Outside Tunnel								
	① Receiving & Distribution Facilities for Electric Supply			L.S.	L.S.	17,288	706	17,994	
	② Installation & Dismantling of Water Treatment Plant for Drainage Facilities					20,238	33	20,271	
	③ High Tension Power Line	km	0	900,000	100,000	-	-	-	1x10^6Baht/km
	④ Access Road	m	0	2,660	1,140	-	-	-	3.8x10^3Baht/m
	⑤ Muck Disposal Treatment	m3	421,000	28	12	11,788	5,052	16,840	40Baht/m3
	⑥ Others	L.S.		5.0%	5.0%	2,466	290	2,756	"①+⋯+⑤"x5%
	Subtotal ("①"+⋯+"⑥")					51,780	6,081	57,861	
	(3) Subtotal ("(1)"+"(2)")					69,745	85,217	154,962	
	4-2 Adit No.1 L=1,981.99 m								
	(1) Temporary Works of Inside Tunnel								
	① Electric Charge of Lighting			L.S.	L.S.	-	17,514	17,514	
	② Electric Charge of Ventilation			L.S.	L.S.	-	4,692	4,692	
	③ Installation & Dismantling of Air Pipe for Ventilation			L.S.	L.S.	1,434	218	1,652	
	④ Electric Charge of Fan			L.S.	L.S.	-	6,879	6,879	
	⑤ Installation & Dismantling of Air Pipe for Fan			L.S.	L.S.	3,534	65	3,599	
	⑥ Electric Charge of Water Supply Pump			L.S.	L.S.	-	312	312	
	⑦ Installation & Dismantling of Water Supply Pipe			L.S.	L.S.	591	125	716	
	⑧ Electric Charge of Drainage Pump			L.S.	L.S.	-	1,608	1,608	
	⑨ Electric Charge of Water Treatment Plant for Drainage System				L.S.	-	894	894	
	⑩ Installation & Dismantling of Drainage Pipe			L.S.	L.S.	404	105	509	
	⑪ Operation Cost for Water Treatment Plant			L.S.	L.S.	1,443	338	1,781	
	⑫ Transportation of Sludge from Water Treatment Plant			L.S.	L.S.	539	132	671	
	Subtotal ("①"+⋯+"⑫")					7,945	32,882	40,827	
	(2) Temporary Works of Outside Tunnel								
	① Receiving & Distribution Facilities for Electric Supply			L.S.	L.S.	2,747	303	3,050	
	② Transportation Cost of Equipment			L.S.	L.S.	377	58	435	
	③ Construction Cost of Tunnel Portal			L.S.	L.S.	898	671	1,569	
	④ High Tension Power Line	km	1.40	900,000	100,000	1,260	140	1,400	1x10^6Baht/km
	⑤ Access Road	m	2,300	2,660	1,140	6,118	2,622	8,740	3.8x10^3Baht/m
	⑥ Muck Disposal Treatment	m3	109,000	28	12	3,052	1,308	4,360	40Baht/m3
	⑦ Others	L.S.		5.0%	5.0%	723	255	978	"①+⋯+⑥"x5%
	Subtotal ("①"+⋯+"⑦")					15,175	5,357	20,532	
	(3) Subtotal ("(1)"+"(2)")					23,120	38,239	61,359	
	4-3 Subtotal ("4-1"+"4-2")					92,865	123,456	216,321	
5	Subtotal ("3"+"4")					1,263,265	358,077	1,621,342	
6	Overhead Cost ("5"x10%)	%		10%	10%	126,327	35,808	162,135	
7	Total Cost ("5"+"6")					1,389,592	393,885	1,783,477	

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

Back Data

Ing-Yot No.2 Tunnel Division 3 with Adit No.2 Div.3 L=5,435.0 m , Adit No.2 L=1,785.19 m

(1,000 Baht)

	Item		Unit	Quantity	Rate (Baht/m)		Cost (1,000Baht)			Remarks
					F.C.	L.C.	F.C.	L.C.	Total	
1	Common Temporary Works		L.S.	"2-3"x5%	5%	5%	64,283	12,977	77,260	
2	Direct Construction Cost									
	2-1 Main Tunnel : Div.3 L=5,435.0 m									
	(1) Excavation									
	Grade	B	m	300.0	85,869	5,395	25,761	1,619	27,380	
		C1	m	1,460.0	79,900	5,054	116,654	7,379	124,033	
		C2	m	1,045.0	65,804	4,742	68,765	4,955	73,720	
		D1	m	1,190.0	55,185	4,452	65,670	5,298	70,968	
		D2	m	930.0	45,433	4,402	42,253	4,094	46,347	
		E1	m	330.0	47,934	4,671	15,818	1,541	17,359	
		E2	m	180.0	48,586	4,694	8,745	845	9,590	
	Subtotal			5,435.0			343,666	25,731	369,397	
	(2) Shotcrete									
	Grade	B	m	300.0	13,084	2,935	3,925	881	4,806	
		C1	m	1,460.0	20,433	3,867	29,832	5,646	35,478	
		C2	m	1,045.0	22,074	4,198	23,067	4,387	27,454	
		D1	m	1,190.0	28,464	5,976	33,872	7,111	40,983	
		D2	m	930.0	36,007	6,766	33,487	6,292	39,779	
		E1	m	330.0	36,649	6,876	12,094	2,269	14,363	
		E2	m	180.0	44,694	8,415	8,045	1,515	9,560	
	Subtotal			5,435.0			144,322	28,101	172,423	
	(3) Rock Bolts									
	Grade	B	m	300.0	13,615	3,707	4,085	1,112	5,197	
		C1	m	1,460.0	17,141	4,846	25,026	7,075	32,101	
		C2	m	1,045.0	21,306	5,593	22,265	5,845	28,110	
		D1	m	1,190.0	41,119	11,812	48,932	14,056	62,988	
		D2	m	930.0	41,119	11,812	38,241	10,985	49,226	
		E1	m	330.0	41,119	11,812	13,569	3,898	17,467	
		E2	m	180.0	51,749	14,202	9,315	2,556	11,871	
	Subtotal			5,435.0			161,433	45,527	206,960	
	(4) Steel Support									
	Grade	B	m	300.0	-	-	-	-	-	
		C1	m	1,460.0	-	-	-	-	-	
		C2	m	1,045.0	24,255	2,667	25,346	2,787	28,133	
		D1	m	1,190.0	42,754	4,584	50,877	5,455	56,332	
		D2	m	930.0	56,295	6,065	52,354	5,640	57,994	
		E1	m	330.0	76,672	8,328	25,302	2,748	28,050	
		E2	m	180.0	76,672	8,328	13,801	1,499	15,300	
	Subtotal			5,435.0			167,680	18,129	185,809	
	(5) Concrete Lining									
	Grade	B	m	300.0	30,438	11,997	9,131	3,599	12,730	
		C1	m	1,460.0	30,660	12,092	44,764	17,654	62,418	
		C2	m	1,045.0	30,660	12,092	32,040	12,636	44,676	
		D1	m	1,190.0	34,175	14,712	40,668	17,507	58,175	
		D2	m	930.0	48,900	18,118	45,477	16,850	62,327	
		E1	m	330.0	55,027	20,885	18,159	6,892	25,051	
		E2	m	180.0	64,087	22,510	11,536	4,052	15,588	
	Subtotal			5,435.0			201,775	79,190	280,965	
	(6) Drain Pipe									
	Grade	B	m	300.0	304	1,451	91	435	526	
		C1	m	1,460.0	304	1,451	444	2,118	2,562	
		C2	m	1,045.0	304	1,451	318	1,516	1,834	
		D1	m	1,190.0	304	1,451	362	1,727	2,089	
		D2	m	930.0	304	1,451	283	1,349	1,632	
		E1	m	330.0	320	1,564	106	516	622	
		E2	m	180.0	320	1,564	58	282	340	
	Subtotal			5,435.0			1,662	7,943	9,605	
	(7) Subtotal ("(1)"+ – +"(6)")						1,020,538	204,621	1,225,159	

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

Back Data

Ing-Yot No.2 Tunnel Division 3 with Adit No.2 Div.3 L=5,435.0 m , Adit No.2 L=1,785.19 m

(1,000 Baht)

Item		Unit	Quantity	Rate (Baht/m)		Cost (1,000Baht)			Remarks
				F.C.	L.C.	F.C.	L.C.	Total	
2-2 Adit No.2 L=1,785.19 m									
(1) Excavation									
Grade	B	m	-	48,834	3,075	-	-	-	
	C1	m	110.00	42,833	3,006	4,712	331	5,043	
	C2	m	535.19	34,774	2,628	18,611	1,406	20,017	
	D1	m	550.00	31,769	3,023	17,473	1,663	19,136	
	D2	m	150.00	26,929	3,006	4,039	451	4,490	
	E1	m	170.00	28,641	3,109	4,869	529	5,398	
	E2	m	270.00	28,179	2,950	7,608	797	8,405	
Subtotal			1,785.19			57,312	5,177	62,489	
(2) Shotcrete									
Grade	B	m	-	10,929	2,398	-	-	-	
	C1	m	110.00	15,531	2,913	1,708	320	2,028	
	C2	m	535.19	16,795	3,356	8,989	1,796	10,785	
	D1	m	550.00	22,450	4,377	12,348	2,407	14,755	
	D2	m	150.00	28,862	5,335	4,329	800	5,129	
	E1	m	170.00	28,487	5,376	4,843	914	5,757	
	E2	m	270.00	33,700	6,557	9,099	1,770	10,869	
Subtotal			1,785.19			41,316	8,007	49,323	
(3) Rock Bolts									
Grade	B	m	-	9,170	2,559	-	-	-	
	C1	m	110.00	12,696	3,698	1,397	407	1,804	
	C2	m	535.19	15,878	4,112	8,498	2,201	10,699	
	D1	m	550.00	31,959	9,367	17,577	5,152	22,729	
	D2	m	150.00	31,959	9,367	4,794	1,405	6,199	
	E1	m	170.00	31,959	9,367	5,433	1,592	7,025	
	E2	m	270.00	41,598	11,588	11,231	3,129	14,360	
Subtotal			1,785.19			48,930	13,886	62,816	
(4) Steel Support									
Grade	B	m	-	-	-	-	-	-	
	C1	m	110.00	-	-	-	-	-	
	C2	m	535.19	15,843	1,731	8,479	926	9,405	
	D1	m	550.00	36,412	3,954	20,027	2,175	22,202	
	D2	m	150.00	49,061	5,392	7,359	809	8,168	
	E1	m	170.00	59,408	6,542	10,099	1,112	11,211	
	E2	m	270.00	59,408	6,542	16,040	1,766	17,806	
Subtotal			1,785.19			62,004	6,788	68,792	
(5) Concrete Lining									
Grade	B	m	-	21,869	6,881	-	-	-	
	C1	m	110.00	22,214	6,881	2,444	757	3,201	
	C2	m	535.19	22,214	6,881	11,889	3,683	15,572	
	D1	m	550.00	28,024	11,141	15,413	6,128	21,541	
	D2	m	150.00	37,816	13,467	5,672	2,020	7,692	
	E1	m	170.00	41,451	15,200	7,047	2,584	9,631	
	E2	m	270.00	46,958	16,188	12,679	4,371	17,050	
Subtotal			1,785.19			55,144	19,543	74,687	
(6) Drain Pipe									
Grade	B	m	-	232	836	-	-	-	
	C1	m	110.00	232	836	26	92	118	
	C2	m	535.19	232	836	124	447	571	
	D1	m	550.00	232	836	128	460	588	
	D2	m	150.00	232	836	35	125	160	
	E1	m	170.00	244	904	41	154	195	
	E2	m	270.00	244	904	66	244	310	
Subtotal			1,785.19			420	1,522	1,942	
(7) Subtotal ("(1)"+~+"(6)")						265,126	54,923	320,049	
2-3 Subtotal ("2-1"+~+"2-2")						1,285,664	259,544	1,545,208	
3 Subtotal ("1"+"2")						1,349,947	272,521	1,622,468	

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

Back Data

Ing-Yot No.2 Tunnel Division 3 with Adit No.2 Div.3 L=5,435.0 m , Adit No.2 L=1,785.19 m

(1,000 Baht)

	Item	Unit	Quantity	Rate (Baht/m) F.C.	Rate (Baht/m) L.C.	Cost (1,000Baht) F.C.	Cost (1,000Baht) L.C.	Cost (1,000Baht) Total	Remarks
4	Temporary Works								
	4-1 Main Tunnel : Div.3 L=5,435.0 m								
	(1) Temporary Works of Inside Tunnel								
	① Electric Charge of Lighting			L.S.	L.S.	-	43,266	43,266	
	② Electric Charge of Ventilation			L.S.	L.S.	-	11,589	11,589	
	③ Installation & Dismantling of Air Pipe for Ventilation			L.S.	L.S.	3,651	554	4,205	
	④ Electric Charge of Fan			L.S.	L.S.	-	16,998	16,998	
	⑤ Installation & Dismantling of Air Pipe for Fan			L.S.	L.S.	9,710	180	9,890	
	⑥ Electric Charge of Water Supply Pump			L.S.	L.S.	-	774	774	
	⑦ Installation & Dismantling of Water Supply Pipe			L.S.	L.S.	1,487	316	1,803	
	⑧ Electric Charge of Drainage Pump			L.S.	L.S.	-	3,975	3,975	
	⑨ Electric Charge of Water Treatment Plant for Drainage System			L.S.	L.S.	-	2,208	2,208	
	⑩ Installation & Dismantling of Drainage Pipe			L.S.	L.S.	1,016	264	1,280	
	⑪ Operation Cost for Water Treatment Plant			L.S.	L.S.	3,944	925	4,869	
	⑫ Transportation of Sludge from Water Treatment Plant			L.S.	L.S.	1,331	326	1,657	
	Subtotal ("①"+⋯+"⑫")					21,139	81,375	102,514	
	(2) Temporary Works of Outside Tunnel								
	① Receiving & Distribution Facilities for Electric Supply			L.S.	L.S.	18,377	825	19,202	
	② Installation & Dismantling of Water Treatment Plant for Drainage Facilities					20,238	33	20,271	
	③ High Tension Power Line	km	0	900,000	100,000	-	-	-	1×10^6Baht/km
	④ Access Road	m	0	2,660	1,140	-	-	-	3.8×10^3Baht/m
	⑤ Muck Disposal Treatment	m3	488,000	28	12	13,664	5,856	19,520	40Baht/m3
	⑥ Others	L.S.		5.0%	5.0%	2,614	336	2,950	"①+⋯+⑤"×5%
	Subtotal ("①"+⋯+"⑥")					54,893	7,050	61,943	
	(3) Subtotal ("(1)"+"(2)")					76,032	88,425	164,457	
	4-2 Adit No.2 L=1,785.19 m								
	(1) Temporary Works of Inside Tunnel								
	① Electric Charge of Lighting			L.S.	L.S.	-	16,482	16,482	
	② Electric Charge of Ventilation			L.S.	L.S.	-	4,416	4,416	
	③ Installation & Dismantling of Air Pipe for Ventilation			L.S.	L.S.	1,304	198	1,502	
	④ Electric Charge of Fan			L.S.	L.S.	-	6,474	6,474	
	⑤ Installation & Dismantling of Air Pipe for Fan			L.S.	L.S.	3,195	59	3,254	
	⑥ Electric Charge of Water Supply Pump			L.S.	L.S.	-	294	294	
	⑦ Installation & Dismantling of Water Supply Pipe			L.S.	L.S.	541	115	656	
	⑧ Electric Charge of Drainage Pump			L.S.	L.S.	-	1,515	1,515	
	⑨ Electric Charge of Water Treatment Plant for Drainage System			L.S.	L.S.	-	840	840	
	⑩ Installation & Dismantling of Drainage Pipe			L.S.	L.S.	370	96	466	
	⑪ Operation Cost for Water Treatment Plant			L.S.	L.S.	1,298	304	1,602	
	⑫ Transportation of Sludge from Water Treatment Plant			L.S.	L.S.	507	124	631	
	Subtotal ("①"+⋯+"⑫")					7,215	30,917	38,132	
	(2) Temporary Works of Outside Tunnel								
	① Receiving & Distribution Facilities for Electric Supply			L.S.	L.S.	2,497	276	2,773	
	② Transportation Cost of Equipment			L.S.	L.S.	377	58	435	
	③ Construction Cost of Tunnel Portal			L.S.	L.S.	898	671	1,569	
	④ High Tension Power Line	km	5.90	900,000	100,000	5,310	590	5,900	1×10^6Baht/km
	⑤ Access Road	m	3,080	2,660	1,140	8,193	3,511	11,704	3.8×10^3Baht/m
	⑥ Muck Disposal Treatment	m3	98,000	28	12	2,744	1,176	3,920	40Baht/m3
	⑦ Others	L.S.		5.0%	5.0%	1,001	314	1,315	"①+⋯+⑥"×5%
	Subtotal ("①"+⋯+"⑦")					21,020	6,596	27,616	
	(3) Subtotal ("(1)"+"(2)")					28,235	37,513	65,748	
	4-3 Subtotal ("4-1"+"4-2")					104,267	125,938	230,205	
5	Subtotal ("3"+"4")					1,454,214	398,459	1,852,673	
6	Overhead Cost ("5"×10%)	%		10%	10%	145,421	39,846	185,267	
7	Total Cost ("5"+"6")					1,599,635	438,305	2,037,940	

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

Back Data

Ing-Yot No.2 Tunnel, Division 4 with Adit No.3 Div.4 L=7,215.0 m , Adit No.3 L=2,193.75 m

(1,000 Baht)

	Item		Unit	Quantity	Rate (Baht/m)		Cost (1,000Baht)			Remarks
					F.C.	L.C.	F.C.	L.C.	Total	
1	Common Temporary Works		L.S.	"2-3"x5%	5%	5%	78,446	15,550	93,996	
2	Direct Construction Cost									
	2-1 Main Tunnel : Div.4 L=7,215.0 m									
	(1) Excavation									
	Grade	B	m	470.0	85,869	5,395	40,358	2,536	42,894	
		C1	m	1,210.0	79,900	5,054	96,679	6,115	102,794	
		C2	m	2,555.0	65,804	4,742	168,129	12,116	180,245	
		D1	m	1,750.0	55,185	4,452	96,574	7,791	104,365	
		D2	m	1,090.0	45,433	4,402	49,522	4,798	54,320	
		E1	m	140.0	47,934	4,671	6,711	654	7,365	
		E2	m	-	48,586	4,694	-	-	-	
	Subtotal			7,215.0			457,973	34,010	491,983	
	(2) Shotcrete									
	Grade	B	m	470.0	13,084	2,935	6,149	1,379	7,528	
		C1	m	1,210.0	20,433	3,867	24,724	4,679	29,403	
		C2	m	2,555.0	22,074	4,198	56,399	10,726	67,125	
		D1	m	1,750.0	28,464	5,976	49,812	10,458	60,270	
		D2	m	1,090.0	36,007	6,766	39,248	7,375	46,623	
		E1	m	140.0	36,649	6,876	5,131	963	6,094	
		E2	m	-	44,694	8,415	-	-	-	
	Subtotal			7,215.0			181,463	35,580	217,043	
	(3) Rock Bolts									
	Grade	B	m	470.0	13,615	3,707	6,399	1,742	8,141	
		C1	m	1,210.0	17,141	4,846	20,741	5,864	26,605	
		C2	m	2,555.0	21,306	5,593	54,437	14,290	68,727	
		D1	m	1,750.0	41,119	11,812	71,958	20,671	92,629	
		D2	m	1,090.0	41,119	11,812	44,820	12,875	57,695	
		E1	m	140.0	41,119	11,812	5,757	1,654	7,411	
		E2	m	-	51,749	14,202	-	-	-	
	Subtotal			7,215.0			204,112	57,096	261,208	
	(4) Steel Support									
	Grade	B	m	470.0	-	-	-	-	-	
		C1	m	1,210.0	-	-	-	-	-	
		C2	m	2,555.0	24,255	2,667	61,972	6,814	68,786	
		D1	m	1,750.0	42,754	4,584	74,820	8,022	82,842	
		D2	m	1,090.0	56,295	6,065	61,362	6,611	67,973	
		E1	m	140.0	76,672	8,328	10,734	1,166	11,900	
		E2	m	-	76,672	8,328	-	-	-	
	Subtotal			7,215.0			208,888	22,613	231,501	
	(5) Concrete Lining									
	Grade	B	m	470.0	30,438	11,997	14,306	5,639	19,945	
		C1	m	1,210.0	30,660	12,092	37,099	14,631	51,730	
		C2	m	2,555.0	30,660	12,092	78,336	30,895	109,231	
		D1	m	1,750.0	34,175	14,712	59,806	25,746	85,552	
		D2	m	1,090.0	48,900	18,118	53,301	19,749	73,050	
		E1	m	140.0	55,027	20,885	7,704	2,924	10,628	
		E2	m	-	64,087	22,510	-	-	-	
	Subtotal			7,215.0			250,552	99,584	350,136	
	(6) Drain Pipe									
	Grade	B	m	470.0	304	1,451	143	682	825	
		C1	m	1,210.0	304	1,451	368	1,756	2,124	
		C2	m	2,555.0	304	1,451	777	3,707	4,484	
		D1	m	1,750.0	304	1,451	532	2,539	3,071	
		D2	m	1,090.0	304	1,451	331	1,582	1,913	
		E1	m	140.0	320	1,564	45	219	264	
		E2	m	-	320	1,564	-	-	-	
	Subtotal			7,215.0			2,196	10,485	12,681	
	(7) Subtotal ("(1)"+ ~ +"(6)")						1,305,184	259,368	1,564,552	

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

Back Data

Ing-Yot No.2 Tunnel, Division 4 with Adit No.3 Div.4 L=7,215.0 m , Adit No.3 L=2,193.75 m

(1,000 Baht)

Item		Unit	Quantity	Rate (Baht/m)		Cost (1,000Baht)			Remarks
				F.C.	L.C.	F.C.	L.C.	Total	
2-2 Adit No.3 L=2,193.75 m									
(1) Excavation									
Grade	B	m	600.00	48,834	3,075	29,300	1,845	31,145	
	C1	m	783.75	42,833	3,006	33,570	2,356	35,926	
	C2	m	150.00	34,774	2,628	5,216	394	5,610	
	D1	m	170.00	31,769	3,023	5,401	514	5,915	
	D2	m	160.00	26,929	3,006	4,309	481	4,790	
	E1	m	150.00	28,641	3,109	4,296	466	4,762	
	E2	m	180.00	28,179	2,950	5,072	531	5,603	
Subtotal			2,193.75			87,164	6,587	93,751	
(2) Shotcrete									
Grade	B	m	600.00	10,929	2,398	6,557	1,439	7,996	
	C1	m	783.75	15,531	2,913	12,172	2,283	14,455	
	C2	m	150.00	16,795	3,356	2,519	503	3,022	
	D1	m	170.00	22,450	4,377	3,817	744	4,561	
	D2	m	160.00	28,862	5,335	4,618	854	5,472	
	E1	m	150.00	28,487	5,376	4,273	806	5,079	
	E2	m	180.00	33,700	6,557	6,066	1,180	7,246	
Subtotal			2,193.75			40,022	7,809	47,831	
(3) Rock Bolts									
Grade	B	m	600.00	9,170	2,559	5,502	1,535	7,037	
	C1	m	783.75	12,696	3,698	9,950	2,898	12,848	
	C2	m	150.00	15,878	4,112	2,382	617	2,999	
	D1	m	170.00	31,959	9,367	5,433	1,592	7,025	
	D2	m	160.00	31,959	9,367	5,113	1,499	6,612	
	E1	m	150.00	31,959	9,367	4,794	1,405	6,199	
	E2	m	180.00	41,598	11,588	7,488	2,086	9,574	
Subtotal			2,193.75			40,662	11,632	52,294	
(4) Steel Support									
Grade	B	m	600.00	-	-	-	-	-	
	C1	m	783.75	-	-	-	-	-	
	C2	m	150.00	15,843	1,731	2,376	260	2,636	
	D1	m	170.00	36,412	3,954	6,190	672	6,862	
	D2	m	160.00	49,061	5,392	7,850	863	8,713	
	E1	m	150.00	59,408	6,542	8,911	981	9,892	
	E2	m	180.00	59,408	6,542	10,693	1,178	11,871	
Subtotal			2,193.75			36,020	3,954	39,974	
(5) Concrete Lining									
Grade	B	m	600.00	21,869	6,881	13,121	4,129	17,250	
	C1	m	783.75	22,214	6,881	17,410	5,393	22,803	
	C2	m	150.00	22,214	6,881	3,332	1,032	4,364	
	D1	m	170.00	28,024	11,141	4,764	1,894	6,658	
	D2	m	160.00	37,816	13,467	6,051	2,155	8,206	
	E1	m	150.00	41,451	15,200	6,218	2,280	8,498	
	E2	m	180.00	46,958	16,188	8,452	2,914	11,366	
Subtotal			2,193.75			59,348	19,797	79,145	
(6) Drain Pipe									
Grade	B	m	600.00	232	836	139	502	641	
	C1	m	783.75	232	836	182	655	837	
	C2	m	150.00	232	836	35	125	160	
	D1	m	170.00	232	836	39	142	181	
	D2	m	160.00	232	836	37	134	171	
	E1	m	150.00	244	904	37	136	173	
	E2	m	180.00	244	904	44	163	207	
Subtotal			2,193.75			513	1,857	2,370	
(7) Subtotal ("(1)"+~+"(6)")						263,729	51,636	315,365	
2-3 Subtotal ("2-1"+~+"2-2")						1,568,913	311,004	1,879,917	
3 Subtotal ("1"+"2")						1,647,359	326,554	1,973,913	

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

Back Data

Ing-Yot No.2 Tunnel, Division 4 with Adit No.3 Div.4 L=7,215.0 m , Adit No.3 L=2,193.75 m

(1,000 Baht)

	Item	Unit	Quantity	Rate (Baht/m) F.C.	Rate (Baht/m) L.C.	Cost (1,000Baht) F.C.	Cost (1,000Baht) L.C.	Cost (1,000Baht) Total	Remarks
4	Temporary Works								
	4-1 Main Tunnel : Div.4 L=7,215.0 m								
	(1) Temporary Works of Inside Tunnel								
	① Electric Charge of Lighting			L.S.	L.S.	-	43,266	43,266	
	② Electric Charge of Ventilation			L.S.	L.S.	-	11,589	11,589	
	③ Installation & Dismantling of Air Pipe for Ventilation			L.S.	L.S.	4,825	733	5,558	
	④ Electric Charge of Fan			L.S.	L.S.	-	16,998	16,998	
	⑤ Installation & Dismantling of Air Pipe for Fan			L.S.	L.S.	12,888	238	13,126	
	⑥ Electric Charge of Water Supply Pump			L.S.	L.S.	-	774	774	
	⑦ Installation & Dismantling of Water Supply Pipe			L.S.	L.S.	1,948	414	2,362	
	⑧ Electric Charge of Drainage Pump			L.S.	L.S.	-	3,975	3,975	
	⑨ Electric Charge of Water Treatment Plant for Drainage System				L.S.	-	2,208	2,208	
	⑩ Installation & Dismantling of Drainage Pipe			L.S.	L.S.	1,331	346	1,677	
	⑪ Operation Cost for Water Treatment Plant			L.S.	L.S.	5,235	1,227	6,462	
	⑫ Transportation of Sludge from Water Treatment Plant			L.S.	L.S.	1,331	326	1,657	
	Subtotal ("①"+⋯+"⑫")					27,558	82,094	109,652	
	(2) Temporary Works of Outside Tunnel								
	① Receiving & Distribution Facilities for Electric Supply			L.S.	L.S.	21,551	1,075	22,626	
	② Installation & Dismantling of Water Treatment Plant for Drainage Facilities					20,238	33	20,271	
	③ High Tension Power Line	km	0	900,000	100,000	-	-	-	1x10^6Baht/km
	④ Access Road	m	0	2,660	1,140	-	-	-	3.8x10^3Baht/m
	⑤ Muck Disposal Treatment	m3	666,000	28	12	18,648	7,992	26,640	40Baht/m3
	⑥ Others	L.S.		5.0%	5.0%	3,022	455	3,477	"①+⋯+⑤"x5%
	Subtotal ("①"+⋯+"⑥")					63,459	9,555	73,014	
	(3) Subtotal ("(1)"+"(2)")					91,017	91,649	182,666	
	4-2 Adit No.3 L=2,193.75 m								
	(1) Temporary Works of Inside Tunnel								
	① Electric Charge of Lighting			L.S.	L.S.	-	18,543	18,543	
	② Electric Charge of Ventilation			L.S.	L.S.	-	4,968	4,968	
	③ Installation & Dismantling of Air Pipe for Ventilation			L.S.	L.S.	1,565	238	1,803	
	④ Electric Charge of Fan			L.S.	L.S.	-	7,284	7,284	
	⑤ Installation & Dismantling of Air Pipe for Fan			L.S.	L.S.	3,909	72	3,981	
	⑥ Electric Charge of Water Supply Pump			L.S.	L.S.	-	330	330	
	⑦ Installation & Dismantling of Water Supply Pipe			L.S.	L.S.	645	137	782	
	⑧ Electric Charge of Drainage Pump			L.S.	L.S.	-	1,704	1,704	
	⑨ Electric Charge of Water Treatment Plant for Drainage System				L.S.	-	945	945	
	⑩ Installation & Dismantling of Drainage Pipe			L.S.	L.S.	441	115	556	
	⑪ Operation Cost for Water Treatment Plant			L.S.	L.S.	1,595	374	1,969	
	⑫ Transportation of Sludge from Water Treatment Plant			L.S.	L.S.	570	139	709	
	Subtotal ("①"+⋯+"⑫")					8,725	34,849	43,574	
	(2) Temporary Works of Outside Tunnel								
	① Receiving & Distribution Facilities for Electric Supply			L.S.	L.S.	2,996	330	3,326	
	② Transportation Cost of Equipment			L.S.	L.S.	377	58	435	
	③ Construction Cost of Tunnel Portal			L.S.	L.S.	898	671	1,569	
	④ High Tension Power Line	km	6.05	900,000	100,000	5,445	605	6,050	1x10^6Baht/km
	⑤ Access Road	m	1,370	2,660	1,140	3,644	1,562	5,206	3.8x10^3Baht/m
	⑥ Muck Disposal Treatment	m3	112,000	28	12	3,136	1,344	4,480	40Baht/m3
	⑦ Others	L.S.		5.0%	5.0%	825	229	1,054	"①+⋯+⑥"x5%
	Subtotal ("①"+⋯+"⑦")					17,321	4,799	22,120	
	(3) Subtotal ("(1)"+"(2)")					26,046	39,648	65,694	
	4-3 Subtotal ("4-1"+"4-2")					117,063	131,297	248,360	
5	Subtotal ("3"+"4")					1,764,422	457,851	2,222,273	
6	Overhead Cost ("5"x10%)	%		10%	10%	176,442	45,785	222,227	
7	Total Cost ("5"+"6")					1,940,864	503,636	2,444,500	

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

Back Data

Ing-Yot No.2 Tunnel Division 5 with Adit No.4 Div.5 L=6,440.0 m , Adit No.4 L=3,171.48 m

(1,000 Baht)

	Item		Unit	Quantity	Rate (Baht/m)		Cost (1,000Baht)			Remarks
					F.C.	L.C.	F.C.	L.C.	Total	
1	Common Temporary Works		L.S.	"2-3"×5%	5%	5%	72,462	14,005	86,467	
2	Direct Construction Cost									
	2-1 Main Tunnel : Div.5 L=6,440.0 m									
	(1) Excavation									
	Grade	B	m	580.0	85,869	5,395	49,804	3,129	52,933	
		C1	m	990.0	79,900	5,054	79,101	5,003	84,104	
		C2	m	3,240.0	65,804	4,742	213,205	15,364	228,569	
		D1	m	1,360.0	55,185	4,452	75,052	6,055	81,107	
		D2	m	260.0	45,433	4,402	11,813	1,145	12,958	
		E1	m	10.0	47,934	4,671	479	47	526	
		E2	m	-	48,586	4,694	-	-	-	
	Subtotal			6,440.0			429,454	30,743	460,197	
	(2) Shotcrete									
	Grade	B	m	580.0	13,084	2,935	7,589	1,702	9,291	
		C1	m	990.0	20,433	3,867	20,229	3,828	24,057	
		C2	m	3,240.0	22,074	4,198	71,520	13,602	85,122	
		D1	m	1,360.0	28,464	5,976	38,711	8,127	46,838	
		D2	m	260.0	36,007	6,766	9,362	1,759	11,121	
		E1	m	10.0	36,649	6,876	366	69	435	
		E2	m	-	44,694	8,415	-	-	-	
	Subtotal			6,440.0			147,777	29,087	176,864	
	(3) Rock Bolts									
	Grade	B	m	580.0	13,615	3,707	7,897	2,150	10,047	
		C1	m	990.0	17,141	4,846	16,970	4,798	21,768	
		C2	m	3,240.0	21,306	5,593	69,031	18,121	87,152	
		D1	m	1,360.0	41,119	11,812	55,922	16,064	71,986	
		D2	m	260.0	41,119	11,812	10,691	3,071	13,762	
		E1	m	10.0	41,119	11,812	411	118	529	
		E2	m	-	51,749	14,202	-	-	-	
	Subtotal			6,440.0			160,922	44,322	205,244	
	(4) Steel Support									
	Grade	B	m	580.0	-	-	-	-	-	
		C1	m	990.0	-	-	-	-	-	
		C2	m	3,240.0	24,255	2,667	78,586	8,641	87,227	
		D1	m	1,360.0	42,754	4,584	58,145	6,234	64,379	
		D2	m	260.0	56,295	6,065	14,637	1,577	16,214	
		E1	m	10.0	76,672	8,328	767	83	850	
		E2	m	-	76,672	8,328	-	-	-	
	Subtotal			6,440.0			152,135	16,535	168,670	
	(5) Concrete Lining									
	Grade	B	m	580.0	30,438	11,997	17,654	6,958	24,612	
		C1	m	990.0	30,660	12,092	30,353	11,971	42,324	
		C2	m	3,240.0	30,660	12,092	99,338	39,178	138,516	
		D1	m	1,360.0	34,175	14,712	46,478	20,008	66,486	
		D2	m	260.0	48,900	18,118	12,714	4,711	17,425	
		E1	m	10.0	55,027	20,885	550	209	759	
		E2	m	-	64,087	22,510	-	-	-	
	Subtotal			6,440.0			207,087	83,035	290,122	
	(6) Drain Pipe									
	Grade	B	m	580.0	304	1,451	176	842	1,018	
		C1	m	990.0	304	1,451	301	1,436	1,737	
		C2	m	3,240.0	304	1,451	985	4,701	5,686	
		D1	m	1,360.0	304	1,451	413	1,973	2,386	
		D2	m	260.0	304	1,451	79	377	456	
		E1	m	10.0	320	1,564	3	16	19	
		E2	m	-	320	1,564	-	-	-	
	Subtotal			6,440.0			1,957	9,345	11,302	
	(7) Subtotal ("(1)"+ - +"(6)")						1,099,332	213,067	1,312,399	

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

Back Data

Ing-Yot No.2 Tunnel Division 5 with Adit No.4 Div.5 L=6,440.0 m , Adit No.4 L=3,171.48 m

(1,000 Baht)

	Item		Unit	Quantity	Rate (Baht/m)		Cost (1,000Baht)			Remarks
					F.C.	L.C.	F.C.	L.C.	Total	
	2-2 Adit No.4 L=3,171.48 m									
	(1) Excavation									
	Grade	B	m	541.48	48,834	3,075	26,443	1,665	28,108	
		C1	m	1,550.00	42,833	3,006	66,391	4,659	71,050	
		C2	m	540.00	34,774	2,628	18,778	1,419	20,197	
		D1	m	130.00	31,769	3,023	4,130	393	4,523	
		D2	m	130.00	26,929	3,006	3,501	391	3,892	
		E1	m	130.00	28,641	3,109	3,723	404	4,127	
		E2	m	150.00	28,179	2,950	4,227	443	4,670	
	Subtotal			3,171.48			127,193	9,374	136,567	
	(2) Shotcrete									
	Grade	B	m	541.48	10,929	2,398	5,918	1,298	7,216	
		C1	m	1,550.00	15,531	2,913	24,073	4,515	28,588	
		C2	m	540.00	16,795	3,356	9,069	1,812	10,881	
		D1	m	130.00	22,450	4,377	2,919	569	3,488	
		D2	m	130.00	28,862	5,335	3,752	694	4,446	
		E1	m	130.00	28,487	5,376	3,703	699	4,402	
		E2	m	150.00	33,700	6,557	5,055	984	6,039	
	Subtotal			3,171.48			54,489	10,571	65,060	
	(3) Rock Bolts									
	Grade	B	m	541.48	9,170	2,559	4,965	1,386	6,351	
		C1	m	1,550.00	12,696	3,698	19,679	5,732	25,411	
		C2	m	540.00	15,878	4,112	8,574	2,220	10,794	
		D1	m	130.00	31,959	9,367	4,155	1,218	5,373	
		D2	m	130.00	31,959	9,367	4,155	1,218	5,373	
		E1	m	130.00	31,959	9,367	4,155	1,218	5,373	
		E2	m	150.00	41,598	11,588	6,240	1,738	7,978	
	Subtotal			3,171.48			51,923	14,730	66,653	
	(4) Steel Support									
	Grade	B	m	541.48	-	-	-	-	-	
		C1	m	1,550.00	-	-	-	-	-	
		C2	m	540.00	15,843	1,731	8,555	935	9,490	
		D1	m	130.00	36,412	3,954	4,734	514	5,248	
		D2	m	130.00	49,061	5,392	6,378	701	7,079	
		E1	m	130.00	59,408	6,542	7,723	850	8,573	
		E2	m	150.00	59,408	6,542	8,911	981	9,892	
	Subtotal			3,171.48			36,301	3,981	40,282	
	(5) Concrete Lining									
	Grade	B	m	541.48	21,869	6,881	11,842	3,726	15,568	
		C1	m	1,550.00	22,214	6,881	34,432	10,666	45,098	
		C2	m	540.00	22,214	6,881	11,996	3,716	15,712	
		D1	m	130.00	28,024	11,141	3,643	1,448	5,091	
		D2	m	130.00	37,816	13,467	4,916	1,751	6,667	
		E1	m	130.00	41,451	15,200	5,389	1,976	7,365	
		E2	m	150.00	46,958	16,188	7,044	2,428	9,472	
	Subtotal			3,171.48			79,262	25,711	104,973	
	(6) Drain Pipe									
	Grade	B	m	541.48	232	836	126	453	579	
		C1	m	1,550.00	232	836	360	1,296	1,656	
		C2	m	540.00	232	836	125	451	576	
		D1	m	130.00	232	836	30	109	139	
		D2	m	130.00	232	836	30	109	139	
		E1	m	130.00	244	904	32	118	150	
		E2	m	150.00	244	904	37	136	173	
	Subtotal			3,171.48			740	2,672	3,412	
	(7) Subtotal ("(1)"+~+"(6)")						**349,908**	**67,039**	**416,947**	
	2-3 Subtotal ("2-1"+~+"2-2")						**1,449,240**	**280,106**	**1,729,346**	
3	Subtotal ("1"+"2")						**1,521,702**	**294,111**	**1,815,813**	

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

Back Data

Ing-Yot No.2 Tunnel Division 5 with Adit No.4 Div.5 L=6,440.0 m , Adit No.4 L=3,171.48 m

(1,000 Baht)

	Item	Unit	Quantity	Rate (Baht/m) F.C.	Rate (Baht/m) L.C.	Cost (1,000Baht) F.C.	Cost (1,000Baht) L.C.	Cost (1,000Baht) Total	Remarks
4	Temporary Works								
	4-1 Main Tunnel : Div.5 L=6,440.0 m								
	(1) Temporary Works of Inside Tunnel								
	① Electric Charge of Lighting			L.S.	L.S.	-	37,086	37,086	
	② Electric Charge of Ventilation			L.S.	L.S.	-	9,933	9,933	
	③ Installation & Dismantling of Air Pipe for Ventilation			L.S.	L.S.	4,303	653	4,956	
	④ Electric Charge of Fan			L.S.	L.S.	-	14,571	14,571	
	⑤ Installation & Dismantling of Air Pipe for Fan			L.S.	L.S.	11,495	213	11,708	
	⑥ Electric Charge of Water Supply Pump			L.S.	L.S.	-	663	663	
	⑦ Installation & Dismantling of Water Supply Pipe			L.S.	L.S.	1,746	371	2,117	
	⑧ Electric Charge of Drainage Pump			L.S.	L.S.	-	3,405	3,405	
	⑨ Electric Charge of Water Treatment Plant for Drainage System				L.S.	-	1,893	1,893	
	⑩ Installation & Dismantling of Drainage Pipe			L.S.	L.S.	1,193	310	1,503	
	⑪ Operation Cost for Water Treatment Plant			L.S.	L.S.	4,669	1,095	5,764	
	⑫ Transportation of Sludge from Water Treatment Plant			L.S.	L.S.	1,144	280	1,424	
	Subtotal ("①"+⋯+"⑫")					24,550	70,473	95,023	
	(2) Temporary Works of Outside Tunnel								
	① Receiving & Distribution Facilities for Electric Supply			L.S.	L.S.	19,689	967	20,656	
	② Installation & Dismantling of Water Treatment Plant for Drainage Facilities					20,238	33	20,271	
	③ High Tension Power Line	km	0	900,000	100,000	-	-	-	1x10^6Baht/km
	④ Access Road	m	0	2,660	1,140	-	-	-	3.8x10^3Baht/m
	⑤ Muck Disposal Treatment	m3	588,000	28	12	16,464	7,056	23,520	40Baht/m3
	⑥ Others	L.S.		5.0%	5.0%	2,820	403	3,223	"①+⋯+⑤"x5%
	Subtotal ("①"+⋯+"⑥")					59,211	8,459	67,670	
	(3) Subtotal ("(1)"+"(2)")					83,761	78,932	162,693	
	4-2 Adit No.4 L=3,171.48 m								
	(1) Temporary Works of Inside Tunnel								
	① Electric Charge of Lighting			L.S.	L.S.	-	22,665	22,665	
	② Electric Charge of Ventilation			L.S.	L.S.	-	6,072	6,072	
	③ Installation & Dismantling of Air Pipe for Ventilation			L.S.	L.S.	2,217	337	2,554	
	④ Electric Charge of Fan			L.S.	L.S.	-	8,904	8,904	
	⑤ Installation & Dismantling of Air Pipe for Fan			L.S.	L.S.	5,658	105	5,763	
	⑥ Electric Charge of Water Supply Pump			L.S.	L.S.	-	405	405	
	⑦ Installation & Dismantling of Water Supply Pipe			L.S.	L.S.	899	191	1,090	
	⑧ Electric Charge of Drainage Pump			L.S.	L.S.	-	2,082	2,082	
	⑨ Electric Charge of Water Treatment Plant for Drainage System				L.S.	-	1,155	1,155	
	⑩ Installation & Dismantling of Drainage Pipe			L.S.	L.S.	614	160	774	
	⑪ Operation Cost for Water Treatment Plant			L.S.	L.S.	2,306	541	2,847	
	⑫ Transportation of Sludge from Water Treatment Plant			L.S.	L.S.	699	171	870	
	Subtotal ("①"+⋯+"⑫")					12,393	42,788	55,181	
	(2) Temporary Works of Outside Tunnel								
	① Receiving & Distribution Facilities for Electric Supply			L.S.	L.S.	4,192	463	4,655	
	② Transportation Cost of Equipment			L.S.	L.S.	377	58	435	
	③ Construction Cost of Tunnel Portal			L.S.	L.S.	898	671	1,569	
	④ High Tension Power Line	km	1.60	900,000	100,000	1,440	160	1,600	1x10^6Baht/km
	⑤ Access Road	m	2,990	2,660	1,140	7,953	3,409	11,362	3.8x10^3Baht/m
	⑥ Muck Disposal Treatment	m3	158,000	28	12	4,424	1,896	6,320	40Baht/m3
	⑦ Others	L.S.		5.0%	5.0%	964	333	1,297	"①+⋯+⑥"x5%
	Subtotal ("①"+⋯+"⑦")					20,248	6,990	27,238	
	(3) Subtotal ("(1)"+"(2)")					32,641	49,778	82,419	
	4-3 Subtotal ("4-1"+"4-2")					116,402	128,710	245,112	
5	Subtotal ("3"+"4")					1,638,104	422,821	2,060,925	
6	Overhead Cost ("5"x10%)	%		10%	10%	163,810	42,282	206,092	
7	Total Cost ("5"+"6")					1,801,914	465,103	2,267,017	

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

Back Data

Ing-Yot No.2 Tunnel Division 6 with Adit No.5 Div.6 L=6,400 m, Adit No.5 L=2,476.0 m

(1,000 Baht)

	Item		Unit	Quantity	Rate (Baht/m)		Cost (1,000Baht)			Remarks
					F.C.	L.C.	F.C.	L.C.	Total	
1	Common Temporary Works		L.S.	"2-3"×5%	5%	5%	74,356	14,776	89,132	
2	Direct Construction Cost									
	2-1 Main Tunnel : Div.6 L=6,400 m									
	(1) Excavation									
	Grade	B	m	420.0	85,869	5,395	36,065	2,266	38,331	
		C1	m	1,040.0	79,900	5,054	83,096	5,256	88,352	
		C2	m	2,370.0	65,804	4,742	155,955	11,239	167,194	
		D1	m	1,190.0	55,185	4,452	65,670	5,298	70,968	
		D2	m	970.0	45,433	4,402	44,070	4,270	48,340	
		E1	m	400.0	47,934	4,671	19,174	1,868	21,042	
		E2	m	10.0	48,586	4,694	486	47	533	
	Subtotal			6,400.0			404,516	30,244	434,760	
	(2) Shotcrete									
	Grade	B	m	420.0	13,084	2,935	5,495	1,233	6,728	
		C1	m	1,040.0	20,433	3,867	21,250	4,022	25,272	
		C2	m	2,370.0	22,074	4,198	52,315	9,949	62,264	
		D1	m	1,190.0	28,464	5,976	33,872	7,111	40,983	
		D2	m	970.0	36,007	6,766	34,927	6,563	41,490	
		E1	m	400.0	36,649	6,876	14,660	2,750	17,410	
		E2	m	10.0	44,694	8,415	447	84	531	
	Subtotal			6,400.0			162,966	31,712	194,678	
	(3) Rock Bolts									
	Grade	B	m	420.0	13,615	3,707	5,718	1,557	7,275	
		C1	m	1,040.0	17,141	4,846	17,827	5,040	22,867	
		C2	m	2,370.0	21,306	5,593	50,495	13,255	63,750	
		D1	m	1,190.0	41,119	11,812	48,932	14,056	62,988	
		D2	m	970.0	41,119	11,812	39,885	11,458	51,343	
		E1	m	400.0	41,119	11,812	16,448	4,725	21,173	
		E2	m	10.0	51,749	14,202	517	142	659	
	Subtotal			6,400.0			179,822	50,233	230,055	
	(4) Steel Support									
	Grade	B	m	420.0	-	-	-	-	-	
		C1	m	1,040.0	-	-	-	-	-	
		C2	m	2,370.0	24,255	2,667	57,484	6,321	63,805	
		D1	m	1,190.0	42,754	4,584	50,877	5,455	56,332	
		D2	m	970.0	56,295	6,065	54,606	5,883	60,489	
		E1	m	400.0	76,672	8,328	30,669	3,331	34,000	
		E2	m	10.0	76,672	8,328	767	83	850	
	Subtotal			6,400.0			194,403	21,073	215,476	
	(5) Concrete Lining									
	Grade	B	m	420.0	30,438	11,997	12,784	5,039	17,823	
		C1	m	1,040.0	30,660	12,092	31,886	12,576	44,462	
		C2	m	2,370.0	30,660	12,092	72,664	28,658	101,322	
		D1	m	1,190.0	34,175	14,712	40,668	17,507	58,175	
		D2	m	970.0	48,900	18,118	47,433	17,574	65,007	
		E1	m	400.0	55,027	20,885	22,011	8,354	30,365	
		E2	m	10.0	64,087	22,510	641	225	866	
	Subtotal			6,400.0			228,087	89,933	318,020	
	(6) Drain Pipe									
	Grade	B	m	420.0	304	1,451	128	609	737	
		C1	m	1,040.0	304	1,451	316	1,509	1,825	
		C2	m	2,370.0	304	1,451	720	3,439	4,159	
		D1	m	1,190.0	304	1,451	362	1,727	2,089	
		D2	m	970.0	304	1,451	295	1,407	1,702	
		E1	m	400.0	320	1,564	128	626	754	
		E2	m	10.0	320	1,564	3	16	19	
	Subtotal			6,400.0			1,952	9,333	11,285	
	(7) Subtotal ("(1)"+ – +"(6)")						1,171,746	232,528	1,404,274	

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

Back Data

Ing-Yot No.2 Tunnel Division 6 with Adit No.5 Div.6 L=6,400 m, Adit No.5 L=2,476.0 m

(1,000 Baht)

Item		Unit	Quantity	Rate (Baht/m)		Cost (1,000Baht)			Remarks
				F.C.	L.C.	F.C.	L.C.	Total	
2-2 Adit No.5 L=2,476.0 m									
(1) Excavation									
Grade	B	m	330.0	48,834	3,075	16,115	1,015	17,130	
	C1	m	656.0	42,833	3,006	28,098	1,972	30,070	
	C2	m	510.0	34,774	2,628	17,735	1,340	19,075	
	D1	m	350.0	31,769	3,023	11,119	1,058	12,177	
	D2	m	270.0	26,929	3,006	7,271	812	8,083	
	E1	m	280.0	28,641	3,109	8,019	871	8,890	
	E2	m	80.0	28,179	2,950	2,254	236	2,490	
Subtotal			2,476.0			90,611	7,304	97,915	
(2) Shotcrete									
Grade	B	m	330.0	10,929	2,398	3,607	791	4,398	
	C1	m	656.0	15,531	2,913	10,188	1,911	12,099	
	C2	m	510.0	16,795	3,356	8,565	1,712	10,277	
	D1	m	350.0	22,450	4,377	7,858	1,532	9,390	
	D2	m	270.0	28,862	5,335	7,793	1,440	9,233	
	E1	m	280.0	28,487	5,376	7,976	1,505	9,481	
	E2	m	80.0	33,700	6,557	2,696	525	3,221	
Subtotal			2,476.0			48,683	9,416	58,099	
(3) Rock Bolts									
Grade	B	m	330.0	9,170	2,559	3,026	844	3,870	
	C1	m	656.0	12,696	3,698	8,329	2,426	10,755	
	C2	m	510.0	15,878	4,112	8,098	2,097	10,195	
	D1	m	350.0	31,959	9,367	11,186	3,278	14,464	
	D2	m	270.0	31,959	9,367	8,629	2,529	11,158	
	E1	m	280.0	31,959	9,367	8,949	2,623	11,572	
	E2	m	80.0	41,598	11,588	3,328	927	4,255	
Subtotal			2,476.0			51,545	14,724	66,269	
(4) Steel Support									
Grade	B	m	330.0	-	-	-	-	-	
	C1	m	656.0	-	-	-	-	-	
	C2	m	510.0	15,843	1,731	8,080	883	8,963	
	D1	m	350.0	36,412	3,954	12,744	1,384	14,128	
	D2	m	270.0	49,061	5,392	13,246	1,456	14,702	
	E1	m	280.0	59,408	6,542	16,634	1,832	18,466	
	E2	m	80.0	59,408	6,542	4,753	523	5,276	
Subtotal			2,476.0			55,457	6,078	61,535	
(5) Concrete Lining									
Grade	B	m	330.0	21,869	6,881	7,217	2,271	9,488	
	C1	m	656.0	22,214	6,881	14,572	4,514	19,086	
	C2	m	510.0	22,214	6,881	11,329	3,509	14,838	
	D1	m	350.0	28,024	11,141	9,808	3,899	13,707	
	D2	m	270.0	37,816	13,467	10,210	3,636	13,846	
	E1	m	280.0	41,451	15,200	11,606	4,256	15,862	
	E2	m	80.0	46,958	16,188	3,757	1,295	5,052	
Subtotal			2,476.0			68,499	23,380	91,879	
(6) Drain Pipe									
Grade	B	m	330.0	232	836	77	276	353	
	C1	m	656.0	232	836	152	548	700	
	C2	m	510.0	232	836	118	426	544	
	D1	m	350.0	232	836	81	293	374	
	D2	m	270.0	232	836	63	226	289	
	E1	m	280.0	244	904	68	253	321	
	E2	m	80.0	244	904	20	72	92	
Subtotal			2,476.0			579	2,094	2,673	
(7) Subtotal ("(1)"+~+"(6)")						315,374	62,996	378,370	
2-3 Subtotal ("2-1"+~+"2-2")						1,487,120	295,524	1,782,644	
3 Subtotal ("1"+"2")						1,561,476	310,300	1,871,776	

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

(3/3)

Back Data

Ing-Yot No.2 Tunnel Division 6 with Adit No.5 Div.6 L=6,400 m, Adit No.5 L=2,476.0 m

(1,000 Baht)

	Item	Unit	Quantity	Rate (Baht/m) F.C.	Rate (Baht/m) L.C.	Cost (1,000Baht) F.C.	Cost (1,000Baht) L.C.	Cost (1,000Baht) Total	Remarks
4	Temporary Works								
	4-1 Main Tunnel : Div.6 L=6,400 m								
	(1) Temporary Works of Inside Tunnel								
	① Electric Charge of Lighting			L.S.	L.S.	-	40,176	40,176	
	② Electric Charge of Ventilation			L.S.	L.S.	-	10,761	10,761	
	③ Installation & Dismantling of Air Pipe for Ventilation			L.S.	L.S.	4,303	653	4,956	
	④ Electric Charge of Fan			L.S.	L.S.	-	15,783	15,783	
	⑤ Installation & Dismantling of Air Pipe for Fan			L.S.	L.S.	11,424	211	11,635	
	⑥ Electric Charge of Water Supply Pump			L.S.	L.S.	-	717	717	
	⑦ Installation & Dismantling of Water Supply Pipe			L.S.	L.S.	1,735	369	2,104	
	⑧ Electric Charge of Drainage Pump			L.S.	L.S.	-	3,690	3,690	
	⑨ Electric Charge of Water Treatment Plant for Drainage System				L.S.	-	2,049	2,049	
	⑩ Installation & Dismantling of Drainage Pipe			L.S.	L.S.	1,186	308	1,494	
	⑪ Operation Cost for Water Treatment Plant			L.S.	L.S.	4,640	1,088	5,728	
	⑫ Transportation of Sludge from Water Treatment Plant			L.S.	L.S.	1,237	303	1,540	
	Subtotal ("①"+⋯+"⑫")					24,525	76,108	100,633	
	(2) Temporary Works of Outside Tunnel								
	① Receiving & Distribution Facilities for Electric Supply			L.S.	L.S.	19,628	961	20,589	
	② Installation & Dismantling of Water Treatment Plant for Drainage Facilities					20,238	33	20,271	
	③ High Tension Power Line	km	0	900,000	100,000	-	-	-	1×10^6Baht/km
	④ Access Road	m	0	2,660	1,140	-	-	-	3.8×10^3Baht/m
	⑤ Muck Disposal Treatment	m3	593,000	28	12	16,604	7,116	23,720	40Baht/m3
	⑥ Others	L.S.		5.0%	5.0%	2,824	406	3,230	"①+⋯+⑤"×5%
	Subtotal ("①"+⋯+"⑥")					59,294	8,516	67,810	
	(3) Subtotal ("(1)"+"(2)")					83,819	84,624	168,443	
	4-2 Adit No.5 L=2,476.0 m								
	(1) Temporary Works of Inside Tunnel								
	① Electric Charge of Lighting			L.S.	L.S.	-	19,572	19,572	
	② Electric Charge of Ventilation			L.S.	L.S.	-	5,244	5,244	
	③ Installation & Dismantling of Air Pipe for Ventilation			L.S.	L.S.	1,760	267	2,027	
	④ Electric Charge of Fan			L.S.	L.S.	-	7,689	7,689	
	⑤ Installation & Dismantling of Air Pipe for Fan			L.S.	L.S.	4,427	82	4,509	
	⑥ Electric Charge of Water Supply Pump			L.S.	L.S.	-	351	351	
	⑦ Installation & Dismantling of Water Supply Pipe			L.S.	L.S.	720	153	873	
	⑧ Electric Charge of Drainage Pump			L.S.	L.S.	-	1,797	1,797	
	⑨ Electric Charge of Water Treatment Plant for Drainage System				L.S.	-	999	999	
	⑩ Installation & Dismantling of Drainage Pipe			L.S.	L.S.	492	128	620	
	⑪ Operation Cost for Water Treatment Plant			L.S.	L.S.	1,798	422	2,220	
	⑫ Transportation of Sludge from Water Treatment Plant			L.S.	L.S.	601	147	748	
	Subtotal ("①"+⋯+"⑫")					9,798	36,851	46,649	
	(2) Temporary Works of Outside Tunnel								
	① Receiving & Distribution Facilities for Electric Supply			L.S.	L.S.	3,351	370	3,721	
	② Transportation Cost of Equipment			L.S.	L.S.	377	58	435	
	③ Construction Cost of Tunnel Portal			L.S.	L.S.	898	671	1,569	
	④ High Tension Power Line	km	1.00	900,000	100,000	900	100	1,000	1×10^6Baht/km
	⑤ Access Road	m	2,200	2,660	1,140	5,852	2,508	8,360	3.8×10^3Baht/m
	⑥ Muck Disposal Treatment	m3	129,000	28	12	3,612	1,548	5,160	40Baht/m3
	⑦ Others	L.S.		5.0%	5.0%	750	263	1,013	"①+⋯+⑥"×5%
	Subtotal ("①"+⋯+"⑦")					15,740	5,518	21,258	
	(3) Subtotal ("(1)"+"(2)")					25,538	42,369	67,907	
	4-3 Subtotal ("4-1"+"4-2")					109,357	126,993	236,350	
5	Subtotal ("3"+"4")					1,670,833	437,293	2,108,126	
6	Overhead Cost ("5"×10%)	%		10%	10%	167,083	43,729	210,812	
7	Total Cost ("5"+"6")					1,837,916	481,022	2,318,938	

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

Back Data

Ing-Yot No.2 Tunnel, Division 7 with Adit No.6 Div.7 L=6,060.0m, Adit No.6 L=3,338.6m

(1,000 Baht)

	Item		Unit	Quantity	Rate (Baht/m)		Cost (1,000Baht)			Remarks
					F.C.	L.C.	F.C.	L.C.	Total	
1	Common Temporary Works		L.S.	"2-3"×5%	5%	5%	68,092	13,017	81,109	
2	Direct Construction Cost									
	2-1 Main Tunnel : Div.7 L=6,060.0 m									
	(1) Excavation									
	Grade	B	m	560.0	85,869	5,395	48,087	3,021	51,108	
		C1	m	2,250.0	79,900	5,054	179,775	11,372	191,147	
		C2	m	1,880.0	65,804	4,742	123,712	8,915	132,627	
		D1	m	940.0	55,185	4,452	51,874	4,185	56,059	
		D2	m	430.0	45,433	4,402	19,536	1,893	21,429	
		E1	m	-	47,934	4,671	-	-	-	
		E2	m	-	48,586	4,694	-	-	-	
	Subtotal			6,060.0			422,984	29,386	452,370	
	(2) Shotcrete									
	Grade	B	m	560.0	13,084	2,935	7,327	1,644	8,971	
		C1	m	2,250.0	20,433	3,867	45,974	8,701	54,675	
		C2	m	1,880.0	22,074	4,198	41,499	7,892	49,391	
		D1	m	940.0	28,464	5,976	26,756	5,617	32,373	
		D2	m	430.0	36,007	6,766	15,483	2,909	18,392	
		E1	m	-	36,649	6,876	-	-	-	
		E2	m	-	44,694	8,415	-	-	-	
	Subtotal			6,060.0			137,039	26,763	163,802	
	(3) Rock Bolts									
	Grade	B	m	560.0	13,615	3,707	7,624	2,076	9,700	
		C1	m	2,250.0	17,141	4,846	38,567	10,904	49,471	
		C2	m	1,880.0	21,306	5,593	40,055	10,515	50,570	
		D1	m	940.0	41,119	11,812	38,652	11,103	49,755	
		D2	m	430.0	41,119	11,812	17,681	5,079	22,760	
		E1	m	-	41,119	11,812	-	-	-	
		E2	m	-	51,749	14,202	-	-	-	
	Subtotal			6,060.0			142,579	39,677	182,256	
	(4) Steel Support									
	Grade	B	m	560.0	-	-	-	-	-	
		C1	m	2,250.0	-	-	-	-	-	
		C2	m	1,880.0	24,255	2,667	45,599	5,014	50,613	
		D1	m	940.0	42,754	4,584	40,189	4,309	44,498	
		D2	m	430.0	56,295	6,065	24,207	2,608	26,815	
		E1	m	-	76,672	8,328	-	-	-	
		E2	m	-	76,672	8,328	-	-	-	
	Subtotal			6,060.0			109,995	11,931	121,926	
	(5) Concrete Lining									
	Grade	B	m	560.0	30,438	11,997	17,045	6,718	23,763	
		C1	m	2,250.0	30,660	12,092	68,985	27,207	96,192	
		C2	m	1,880.0	30,660	12,092	57,641	22,733	80,374	
		D1	m	940.0	34,175	14,712	32,125	13,829	45,954	
		D2	m	430.0	48,900	18,118	21,027	7,791	28,818	
		E1	m	-	55,027	20,885	-	-	-	
		E2	m	-	64,087	22,510	-	-	-	
	Subtotal			6,060.0			196,823	78,278	275,101	
	(6) Drain Pipe									
	Grade	B	m	560.0	304	1,451	170	813	983	
		C1	m	2,250.0	304	1,451	684	3,265	3,949	
		C2	m	1,880.0	304	1,451	572	2,728	3,300	
		D1	m	940.0	304	1,451	286	1,364	1,650	
		D2	m	430.0	304	1,451	131	624	755	
		E1	m	-	320	1,564	-	-	-	
		E2	m	-	320	1,564	-	-	-	
	Subtotal			6,060.0			1,843	8,794	10,637	
	(7) Subtotal ("(1)"+ – +"(6)")						1,011,263	194,829	1,206,092	

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

Back Data

Ing-Yot No.2 Tunnel, Division 7 with Adit No.6 Div.7 L=6,060.0m, Adit No.6 L=3,338.6m

(1,000 Baht)

	Item		Unit	Quantity	Rate (Baht/m)		Cost (1,000Baht)			Remarks
					F.C.	L.C.	F.C.	L.C.	Total	
	2-2 Adit No.6 L=3,338.6m									
	(1) Excavation									
	Grade	B	m	1,108.6	48,834	3,075	54,137	3,409	57,546	
		C1	m	1,060.0	42,833	3,006	45,403	3,186	48,589	
		C2	m	820.0	34,774	2,628	28,515	2,155	30,670	
		D1	m	80.0	31,769	3,023	2,542	242	2,784	
		D2	m	90.0	26,929	3,006	2,424	271	2,695	
		E1	m	90.0	28,641	3,109	2,578	280	2,858	
		E2	m	90.0	28,179	2,950	2,536	266	2,802	
	Subtotal			3,338.6			138,135	9,809	147,944	
	(2) Shotcrete									
	Grade	B	m	1,108.6	10,929	2,398	12,116	2,658	14,774	
		C1	m	1,060.0	15,531	2,913	16,463	3,088	19,551	
		C2	m	820.0	16,795	3,356	13,772	2,752	16,524	
		D1	m	80.0	22,450	4,377	1,796	350	2,146	
		D2	m	90.0	28,862	5,335	2,598	480	3,078	
		E1	m	90.0	28,487	5,376	2,564	484	3,048	
		E2	m	90.0	33,700	6,557	3,033	590	3,623	
	Subtotal			3,338.6			52,342	10,402	62,744	
	(3) Rock Bolts									
	Grade	B	m	1,108.6	9,170	2,559	10,166	2,837	13,003	
		C1	m	1,060.0	12,696	3,698	13,458	3,920	17,378	
		C2	m	820.0	15,878	4,112	13,020	3,372	16,392	
		D1	m	80.0	31,959	9,367	2,557	749	3,306	
		D2	m	90.0	31,959	9,367	2,876	843	3,719	
		E1	m	90.0	31,959	9,367	2,876	843	3,719	
		E2	m	90.0	41,598	11,588	3,744	1,043	4,787	
	Subtotal			3,338.6			48,697	13,607	62,304	
	(4) Steel Support									
	Grade	B	m	1,108.6	-	-	-	-	-	
		C1	m	1,060.0	-	-	-	-	-	
		C2	m	820.0	15,843	1,731	12,991	1,419	14,410	
		D1	m	80.0	36,412	3,954	2,913	316	3,229	
		D2	m	90.0	49,061	5,392	4,415	485	4,900	
		E1	m	90.0	59,408	6,542	5,347	589	5,936	
		E2	m	90.0	59,408	6,542	5,347	589	5,936	
	Subtotal			3,338.6			31,013	3,398	34,411	
	(5) Concrete Lining									
	Grade	B	m	1,108.6	21,869	6,881	24,244	7,628	31,872	
		C1	m	1,060.0	22,214	6,881	23,547	7,294	30,841	
		C2	m	820.0	22,214	6,881	18,215	5,642	23,857	
		D1	m	80.0	28,024	11,141	2,242	891	3,133	
		D2	m	90.0	37,816	13,467	3,403	1,212	4,615	
		E1	m	90.0	41,451	15,200	3,731	1,368	5,099	
		E2	m	90.0	46,958	16,188	4,226	1,457	5,683	
	Subtotal			3,338.6			79,608	25,492	105,100	
	(6) Drain Pipe									
	Grade	B	m	1,108.6	232	836	257	927	1,184	
		C1	m	1,060.0	232	836	246	886	1,132	
		C2	m	820.0	232	836	190	686	876	
		D1	m	80.0	232	836	19	67	86	
		D2	m	90.0	232	836	21	75	96	
		E1	m	90.0	244	904	22	81	103	
		E2	m	90.0	244	904	22	81	103	
	Subtotal			3,338.6			777	2,803	3,580	
	(7) Subtotal ("(1)"+ – +"(6)")						350,572	65,511	416,083	
	2-3 Subtotal ("2-1"+ – +"2-2")						1,361,835	260,340	1,622,175	
3	Subtotal ("1"+"2")						1,429,927	273,357	1,703,284	

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

(3/3)

Back Data

Ing-Yot No.2 Tunnel, Division 7 with Adit No.6 Div.7 L=6,060.0m, Adit No.6 L=3,338.6m

(1,000 Baht)

	Item	Unit	Quantity	Rate (Baht/m) F.C.	Rate (Baht/m) L.C.	Cost (1,000Baht) F.C.	Cost (1,000Baht) L.C.	Cost (1,000Baht) Total	Remarks
4	Temporary Works								
	4-1 Main Tunnel : Div.7 L=6,060.0 m								
	(1) Temporary Works of Inside Tunnel								
	① Electric Charge of Lighting			L.S.	L.S.	-	35,025	35,025	
	② Electric Charge of Ventilation			L.S.	L.S.	-	9,381	9,381	
	③ Installation & Dismantling of Air Pipe for Ventilation			L.S.	L.S.	4,108	624	4,732	
	④ Electric Charge of Fan			L.S.	L.S.	-	13,761	13,761	
	⑤ Installation & Dismantling of Air Pipe for Fan			L.S.	L.S.	10,817	200	11,017	
	⑥ Electric Charge of Water Supply Pump			L.S.	L.S.	-	624	624	
	⑦ Installation & Dismantling of Water Supply Pipe			L.S.	L.S.	1,647	350	1,997	
	⑧ Electric Charge of Drainage Pump			L.S.	L.S.	-	3,216	3,216	
	⑨ Electric Charge of Water Treatment Plant for Drainage System			L.S.	L.S.	-	1,788	1,788	
	⑩ Installation & Dismantling of Drainage Pipe			L.S.	L.S.	1,126	293	1,419	
	⑪ Operation Cost for Water Treatment Plant			L.S.	L.S.	4,394	1,030	5,424	
	⑫ Transportation of Sludge from Water Treatment Plant			L.S.	L.S.	1,078	264	1,342	
	Subtotal ("①"+⋯+"⑫")					23,170	66,556	89,726	
	(2) Temporary Works of Outside Tunnel								
	① Receiving & Distribution Facilities for Electric Supply			L.S.	L.S.	19,189	911	20,100	
	② Installation & Dismantling of Water Treatment Plant for Drainage Facilities					20,238	33	20,271	
	③ High Tension Power Line	km	0	900,000	100,000	-	-	-	1×10^6Baht/km
	④ Access Road	m	0	2,660	1,140	-	-	-	3.8×10^3Baht/m
	⑤ Muck Disposal Treatment	m3	553,000	28	12	15,484	6,636	22,120	40Baht/m3
	⑥ Others	L.S.		5.0%	5.0%	2,746	379	3,125	"①+⋯+⑤"×5%
	Subtotal ("①"+⋯+"⑥")					57,657	7,959	65,616	
	(3) Subtotal ("(1)"+"(2)")					80,827	74,515	155,342	
	4-2 Adit No.6 L=3,338.6m								
	(1) Temporary Works of Inside Tunnel								
	① Electric Charge of Lighting			L.S.	L.S.	-	23,694	23,694	
	② Electric Charge of Ventilation			L.S.	L.S.	-	6,348	6,348	
	③ Installation & Dismantling of Air Pipe for Ventilation			L.S.	L.S.	2,282	347	2,629	
	④ Electric Charge of Fan			L.S.	L.S.	-	9,309	9,309	
	⑤ Installation & Dismantling of Air Pipe for Fan			L.S.	L.S.	5,962	110	6,072	
	⑥ Electric Charge of Water Supply Pump			L.S.	L.S.	-	423	423	
	⑦ Installation & Dismantling of Water Supply Pipe			L.S.	L.S.	943	200	1,143	
	⑧ Electric Charge of Drainage Pump			L.S.	L.S.	-	2,175	2,175	
	⑨ Electric Charge of Water Treatment Plant for Drainage System			L.S.	L.S.	-	1,209	1,209	
	⑩ Installation & Dismantling of Drainage Pipe			L.S.	L.S.	644	167	811	
	⑪ Operation Cost for Water Treatment Plant			L.S.	L.S.	2,422	568	2,990	
	⑫ Transportation of Sludge from Water Treatment Plant			L.S.	L.S.	730	179	909	
	Subtotal ("①"+⋯+"⑫")					12,983	44,729	57,712	
	(2) Temporary Works of Outside Tunnel								
	① Receiving & Distribution Facilities for Electric Supply			L.S.	L.S.	4,442	490	4,932	
	② Transportation Cost of Equipment			L.S.	L.S.	377	58	435	
	③ Construction Cost of Tunnel Portal			L.S.	L.S.	898	671	1,569	
	④ High Tension Power Line	km	1.55	900,000	100,000	1,395	155	1,550	1×10^6Baht/km
	⑤ Access Road	m	4,700	2,660	1,140	12,502	5,358	17,860	3.8×10^3Baht/m
	⑥ Muck Disposal Treatment	m3	163,000	28	12	4,564	1,956	6,520	40Baht/m3
	⑦ Others	L.S.		5.0%	5.0%	1,209	434	1,643	"①+⋯+⑥"×5%
	Subtotal ("①"+⋯+"⑦")					25,387	9,122	34,509	
	(3) Subtotal ("(1)"+"(2)")					38,370	53,851	92,221	
	4-3 Subtotal ("4-1"+"4-2")					119,197	128,366	247,563	
5	Subtotal ("3"+"4")					1,549,124	401,723	1,950,847	
6	Overhead Cost ("5"×10%)	%		10%	10%	154,912	40,172	195,084	
7	Total Cost ("5"+"6")					1,704,036	441,895	2,145,931	

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

Back Data

Ing-Yot No.2 Tunnel, Division 8 with Adit No.7 Div.8 L=4,950.0m, Adit No.7 L=2,431.92m

(1,000 Baht)

	Item		Unit	Quantity	Rate (Baht/m)		Cost (1,000Baht)			Remarks
					F.C.	L.C.	F.C.	L.C.	Total	
1	Common Temporary Works		L.S.	"2-3"x5%	5%	5%	53,729	10,235	63,964	
2	Direct Construction Cost									
	2-1 Main Tunnel : Div.8 L=4,950.0 m									
	(1) Excavation									
	Grade	B	m	500.0	85,869	5,395	42,935	2,698	45,633	
		C1	m	1,400.0	79,900	5,054	111,860	7,076	118,936	
		C2	m	2,180.0	65,804	4,742	143,453	10,338	153,791	
		D1	m	570.0	55,185	4,452	31,455	2,538	33,993	
		D2	m	300.0	45,433	4,402	13,630	1,321	14,951	
		E1	m	-	47,934	4,671	-	-	-	
		E2	m	-	48,586	4,694	-	-	-	
	Subtotal			4,950.0			343,333	23,971	367,304	
	(2) Shotcrete									
	Grade	B	m	500.0	13,084	2,935	6,542	1,468	8,010	
		C1	m	1,400.0	20,433	3,867	28,606	5,414	34,020	
		C2	m	2,180.0	22,074	4,198	48,121	9,152	57,273	
		D1	m	570.0	28,464	5,976	16,224	3,406	19,630	
		D2	m	300.0	36,007	6,766	10,802	2,030	12,832	
		E1	m	-	36,649	6,876	-	-	-	
		E2	m	-	44,694	8,415	-	-	-	
	Subtotal			4,950.0			110,295	21,470	131,765	
	(3) Rock Bolts									
	Grade	B	m	500.0	13,615	3,707	6,808	1,854	8,662	
		C1	m	1,400.0	17,141	4,846	23,997	6,784	30,781	
		C2	m	2,180.0	21,306	5,593	46,447	12,193	58,640	
		D1	m	570.0	41,119	11,812	23,438	6,733	30,171	
		D2	m	300.0	41,119	11,812	12,336	3,544	15,880	
		E1	m	-	41,119	11,812	-	-	-	
		E2	m	-	51,749	14,202	-	-	-	
	Subtotal			4,950.0			113,026	31,108	144,134	
	(4) Steel Support									
	Grade	B	m	500.0	-	-	-	-	-	
		C1	m	1,400.0	-	-	-	-	-	
		C2	m	2,180.0	24,255	2,667	52,876	5,814	58,690	
		D1	m	570.0	42,754	4,584	24,370	2,613	26,983	
		D2	m	300.0	56,295	6,065	16,889	1,820	18,709	
		E1	m	-	76,672	8,328	-	-	-	
		E2	m	-	76,672	8,328	-	-	-	
	Subtotal			4,950.0			94,135	10,247	104,382	
	(5) Concrete Lining									
	Grade	B	m	500.0	30,438	11,997	15,219	5,999	21,218	
		C1	m	1,400.0	30,660	12,092	42,924	16,929	59,853	
		C2	m	2,180.0	30,660	12,092	66,839	26,361	93,200	
		D1	m	570.0	34,175	14,712	19,480	8,386	27,866	
		D2	m	300.0	48,900	18,118	14,670	5,435	20,105	
		E1	m	-	55,027	20,885	-	-	-	
		E2	m	-	64,087	22,510	-	-	-	
	Subtotal			4,950.0			159,132	63,110	222,242	
	(6) Drain Pipe									
	Grade	B	m	500.0	304	1,451	152	726	878	
		C1	m	1,400.0	304	1,451	426	2,031	2,457	
		C2	m	2,180.0	304	1,451	663	3,163	3,826	
		D1	m	570.0	304	1,451	173	827	1,000	
		D2	m	300.0	304	1,451	91	435	526	
		E1	m	-	320	1,564	-	-	-	
		E2	m	-	320	1,564	-	-	-	
	Subtotal			4,950.0			1,505	7,182	8,687	
	(7) Subtotal ("(1)"+~+"(6)")						821,426	157,088	978,514	

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

Back Data

Ing-Yot No.2 Tunnel, Division 8 with Adit No.7 Div.8 L=4,950.0m, Adit No.7 L=2,431.92m

(1,000 Baht)

	Item		Unit	Quantity	Rate (Baht/m)		Cost (1,000Baht)			Remarks
					F.C.	L.C.	F.C.	L.C.	Total	
	2-2 Adit No.7 L=2,431.92m									
	(1) Excavation									
	Grade	B	m	691.92	48,834	3,075	33,789	2,128	35,917	
		C1	m	980.00	42,833	3,006	41,976	2,946	44,922	
		C2	m	460.00	34,774	2,628	15,996	1,209	17,205	
		D1	m	170.00	31,769	3,023	5,401	514	5,915	
		D2	m	70.00	26,929	3,006	1,885	210	2,095	
		E1	m	30.00	28,641	3,109	859	93	952	
		E2	m	30.00	28,179	2,950	845	89	934	
	Subtotal			2,431.92			100,751	7,189	107,940	
	(2) Shotcrete									
	Grade	B	m	691.92	10,929	2,398	7,562	1,659	9,221	
		C1	m	980.00	15,531	2,913	15,220	2,855	18,075	
		C2	m	460.00	16,795	3,356	7,726	1,544	9,270	
		D1	m	170.00	22,450	4,377	3,817	744	4,561	
		D2	m	70.00	28,862	5,335	2,020	373	2,393	
		E1	m	30.00	28,487	5,376	855	161	1,016	
		E2	m	30.00	33,700	6,557	1,011	197	1,208	
	Subtotal			2,431.92			38,211	7,533	45,744	
	(3) Rock Bolts									
	Grade	B	m	691.92	9,170	2,559	6,345	1,771	8,116	
		C1	m	980.00	12,696	3,698	12,442	3,624	16,066	
		C2	m	460.00	15,878	4,112	7,304	1,892	9,196	
		D1	m	170.00	31,959	9,367	5,433	1,592	7,025	
		D2	m	70.00	31,959	9,367	2,237	656	2,893	
		E1	m	30.00	31,959	9,367	959	281	1,240	
		E2	m	30.00	41,598	11,588	1,248	348	1,596	
	Subtotal			2,431.92			35,968	10,164	46,132	
	(4) Steel Support									
	Grade	B	m	691.92	-	-	-	-	-	
		C1	m	980.00	-	-	-	-	-	
		C2	m	460.00	15,843	1,731	7,288	796	8,084	
		D1	m	170.00	36,412	3,954	6,190	672	6,862	
		D2	m	70.00	49,061	5,392	3,434	377	3,811	
		E1	m	30.00	59,408	6,542	1,782	196	1,978	
		E2	m	30.00	59,408	6,542	1,782	196	1,978	
	Subtotal			2,431.92			20,476	2,237	22,713	
	(5) Concrete Lining									
	Grade	B	m	691.92	21,869	6,881	15,132	4,761	19,893	
		C1	m	980.00	22,214	6,881	21,770	6,743	28,513	
		C2	m	460.00	22,214	6,881	10,218	3,165	13,383	
		D1	m	170.00	28,024	11,141	4,764	1,894	6,658	
		D2	m	70.00	37,816	13,467	2,647	943	3,590	
		E1	m	30.00	41,451	15,200	1,244	456	1,700	
		E2	m	30.00	46,958	16,188	1,409	486	1,895	
	Subtotal			2,431.92			57,184	18,448	75,632	
	(6) Drain Pipe									
	Grade	B	m	691.92	232	836	161	578	739	
		C1	m	980.00	232	836	227	819	1,046	
		C2	m	460.00	232	836	107	385	492	
		D1	m	170.00	232	836	39	142	181	
		D2	m	70.00	232	836	16	59	75	
		E1	m	30.00	244	904	7	27	34	
		E2	m	30.00	244	904	7	27	34	
	Subtotal			2,431.92			564	2,037	2,601	
	(7) Subtotal ("(1)"+~+"(6)")						**253,154**	**47,608**	**300,762**	
	2-3 Subtotal ("2-1"+~+"2-2")						**1,074,580**	**204,696**	**1,279,276**	
3	Subtotal ("1"+"2")						**1,128,309**	**214,931**	**1,343,240**	

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

Back Data

Ing-Yot No.2 Tunnel, Division 8 with Adit No.7 Div.8 L=4,950.0m, Adit No.7 L=2,431.92m

(1,000 Baht)

	Item	Unit	Quantity	Rate (Baht/m) F.C.	Rate (Baht/m) L.C.	Cost (1,000Baht) F.C.	Cost (1,000Baht) L.C.	Cost (1,000Baht) Total	Remarks
4	Temporary Works								
	4-1 Main Tunnel : Div.8 L=4,950.0 m								
	(1) Temporary Works of Inside Tunnel								
	① Electric Charge of Lighting			L.S.	L.S.	-	41,208	41,208	
	② Electric Charge of Ventilation			L.S.	L.S.	-	11,037	11,037	
	③ Installation & Dismantling of Air Pipe for Ventilation			L.S.	L.S.	3,390	515	3,905	
	④ Electric Charge of Fan			L.S.	L.S.	-	16,188	16,188	
	⑤ Installation & Dismantling of Air Pipe for Fan			L.S.	L.S.	8,836	163	8,999	
	⑥ Electric Charge of Water Supply Pump			L.S.	L.S.	-	735	735	
	⑦ Installation & Dismantling of Water Supply Pipe			L.S.	L.S.	1,360	289	1,649	
	⑧ Electric Charge of Drainage Pump			L.S.	L.S.	-	3,783	3,783	
	⑨ Electric Charge of Water Treatment Plant for Drainage System				L.S.	-	2,103	2,103	
	⑩ Installation & Dismantling of Drainage Pipe			L.S.	L.S.	929	242	1,171	
	⑪ Operation Cost for Water Treatment Plant			L.S.	L.S.	3,589	842	4,431	
	⑫ Transportation of Sludge from Water Treatment Plant			L.S.	L.S.	1,269	310	1,579	
	Subtotal ("①"+–+"⑫")					19,373	77,415	96,788	
	(2) Temporary Works of Outside Tunnel								
	① Receiving & Distribution Facilities for Electric Supply			L.S.	L.S.	16,888	754	17,642	
	② Installation & Dismantling of Water Treatment Plant for Drainage Facilities					20,238	33	20,271	
	③ High Tension Power Line	km	0	900,000	100,000	-	-	-	1x10^6Baht/km
	④ Access Road	m	0	2,660	1,140	-	-	-	3.8x10^3Baht/m
	⑤ Muck Disposal Treatment	m3	451,000	28	12	12,628	5,412	18,040	40Baht/m3
	⑥ Others	L.S.		5.0%	5.0%	2,488	310	2,798	"①+–+⑤"x5%
	Subtotal ("①"+–+"⑥")					52,242	6,509	58,751	
	(3) Subtotal ("(1)"+"(2)")					71,615	83,924	155,539	
	4-2 Adit No.7 L=2,431.92m								
	(1) Temporary Works of Inside Tunnel								
	① Electric Charge of Lighting			L.S.	L.S.	-	19,572	19,572	
	② Electric Charge of Ventilation			L.S.	L.S.	-	5,244	5,244	
	③ Installation & Dismantling of Air Pipe for Ventilation			L.S.	L.S.	1,695	257	1,952	
	④ Electric Charge of Fan			L.S.	L.S.	-	7,689	7,689	
	⑤ Installation & Dismantling of Air Pipe for Fan			L.S.	L.S.	4,338	80	4,418	
	⑥ Electric Charge of Water Supply Pump			L.S.	L.S.	-	351	351	
	⑦ Installation & Dismantling of Water Supply Pipe			L.S.	L.S.	707	150	857	
	⑧ Electric Charge of Drainage Pump			L.S.	L.S.	-	1,797	1,797	
	⑨ Electric Charge of Water Treatment Plant for Drainage System				L.S.	-	999	999	
	⑩ Installation & Dismantling of Drainage Pipe			L.S.	L.S.	483	126	609	
	⑪ Operation Cost for Water Treatment Plant			L.S.	L.S.	1,769	415	2,184	
	⑫ Transportation of Sludge from Water Treatment Plant			L.S.	L.S.	601	147	748	
	Subtotal ("①"+–+"⑫")					9,593	36,827	46,420	
	(2) Temporary Works of Outside Tunnel								
	① Receiving & Distribution Facilities for Electric Supply			L.S.	L.S.	3,314	366	3,680	
	② Transportation Cost of Equipment			L.S.	L.S.	377	58	435	
	③ Construction Cost of Tunnel Portal			L.S.	L.S.	898	671	1,569	
	④ High Tension Power Line	km	7.00	900,000	100,000	6,300	700	7,000	1x10^6Baht/km
	⑤ Access Road	m	3,400	2,660	1,140	9,044	3,876	12,920	3.8x10^3Baht/m
	⑥ Muck Disposal Treatment	m3	119,000	28	12	3,332	1,428	4,760	40Baht/m3
	⑦ Others	L.S.		5.0%	5.0%	1,163	355	1,518	"①+–+⑥"x5%
	Subtotal ("①"+–+"⑦")					24,428	7,454	31,882	
	(3) Subtotal ("(1)"+"(2)")					34,021	44,281	78,302	
	4-3 Subtotal ("4-1"+"4-2")					105,636	128,205	233,841	
5	Subtotal ("3"+"4")					1,233,945	343,136	1,577,081	
6	Overhead Cost ("5"x10%)	%		10%	10%	123,395	34,314	157,709	
7	Total Cost ("5"+"6")					1,357,340	377,450	1,734,790	

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

Back Data Ing-Yot No.2 Tunnel, Division 9 L=4,914.6 m (1/2)

(1,000 Baht)

	Item		Unit	Quantity	Rate (Baht/m)		Cost (1,000Baht)			Remarks
					F.C.	L.C.	F.C.	L.C.	Total	
1	Common Temporary Works		L.S.	"2-7"×5%	5%	5%	51,207	10,504	61,711	
2	Direct Construction Cost									
	2-1 Excavation									
	Grade	B	m	-	-	-	-	-	-	
		C1	m	620.0	78,435	4,920	48,630	3,050	51,680	
		C2	m	1,370.0	63,482	4,511	86,970	6,180	93,150	
		D1	m	650.0	55,185	4,452	35,870	2,894	38,764	
		D2	m	790.0	45,035	4,381	35,578	3,461	39,039	
		E1	m	780.0	47,480	4,658	37,034	3,633	40,667	
		E2	m	704.6	48,199	4,678	33,961	3,296	37,257	
	Subtotal			4,914.6			278,043	22,514	300,557	
	2-2 Shotcrete									
	Grade	B	m	-	-	-	-	-	-	
		C1	m	620.0	20,175	3,855	12,509	2,390	14,899	
		C2	m	1,370.0	21,594	4,180	29,584	5,727	35,311	
		D1	m	650.0	28,091	5,936	18,259	3,858	22,117	
		D2	m	790.0	35,527	6,696	28,066	5,290	33,356	
		E1	m	780.0	35,929	6,796	28,025	5,301	33,326	
		E2	m	704.6	44,454	8,406	31,322	5,923	37,245	
	Subtotal			4,914.6			147,765	28,489	176,254	
	2-3 Rock Bolts									
	Grade	B	m	-	-	-	-	-	-	
		C1	m	620.0	17,141	4,846	10,627	3,005	13,632	
		C2	m	1,370.0	21,306	5,593	29,189	7,662	36,851	
		D1	m	650.0	41,119	11,812	26,727	7,678	34,405	
		D2	m	790.0	41,119	11,812	32,484	9,331	41,815	
		E1	m	780.0	41,119	11,812	32,073	9,213	41,286	
		E2	m	704.6	51,749	14,202	36,462	10,007	46,469	
	Subtotal			4,914.6			167,562	46,896	214,458	
	2-4 Steel Support									
	Grade	B	m	-	-	-	-	-	-	
		C1	m	620.0	-	-	-	-	-	
		C2	m	1,370.0	24,255	2,667	33,229	3,654	36,883	
		D1	m	650.0	42,754	4,584	27,790	2,980	30,770	
		D2	m	790.0	56,295	6,065	44,473	4,791	49,264	
		E1	m	780.0	76,672	8,328	59,804	6,496	66,300	
		E2	m	704.6	76,672	8,328	54,023	5,868	59,891	
	Subtotal			4,914.6			219,319	23,789	243,108	
	2-5 Concrete Lining									
	Grade	B	m	-	-	-	-	-	-	
		C1	m	620.0	30,660	12,092	19,009	7,497	26,506	
		C2	m	1,370.0	30,660	12,092	42,004	16,566	58,570	
		D1	m	650.0	34,175	14,712	22,214	9,563	31,777	
		D2	m	790.0	48,900	18,118	38,631	14,313	52,944	
		E1	m	780.0	55,027	20,885	42,921	16,290	59,211	
		E2	m	704.6	64,087	22,510	45,156	15,861	61,017	
	Subtotal			4,914.6			209,935	80,090	290,025	
	2-6 Drain Pipe									
	Grade	B	m	-	-	-	-	-	-	
		C1	m	620.0	304	1,649	188	1,022	1,210	
		C2	m	1,370.0	304	1,649	416	2,259	2,675	
		D1	m	650.0	304	1,649	198	1,072	1,270	
		D2	m	790.0	304	1,649	240	1,303	1,543	
		E1	m	780.0	320	1,778	250	1,387	1,637	
		E2	m	704.6	320	1,778	225	1,253	1,478	
	Subtotal			4,914.6			1,517	8,296	9,813	
	2-7 Subtotal ("2-1"+ ~ +"2-6")						1,024,141	210,074	1,234,215	
3	Subtotal ("1"+"2")						1,075,348	220,578	1,295,926	

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

Back Data | Ing-Yot No.2 Tunnel, Division 9 | L=4,914.6 m | (1,000 Baht) | (2/2)

	Item	Unit	Quantity	Rate (Baht/m)		Cost (1,000Baht)			Remarks
				F.C.	L.C.	F.C.	L.C.	Total	
4	Temporary Works								
	4-1 Temporary Works of Inside Tunnel								
	(1) Electric Charge of Lighting			L.S.	L.S.	-	51,213	51,213	
	(2) Electric Charge of Ventilation			L.S.	L.S.	-	13,719	13,719	
	(3) Installation & Dismantling of Air Pipe for Ventilation			L.S.	L.S.	3,325	505	3,830	
	(4) Electric Charge of Fan			L.S.	L.S.	-	20,121	20,121	
	(5) Installation & Dismantling of Air Pipe for Fan			L.S.	L.S.	8,764	162	8,926	
	(6) Electric Charge of Water Supply Pump			L.S.	L.S.	-	915	915	
	(7) Installation & Dismantling of Water Supply Pipe			L.S.	L.S.	1,349	287	1,636	
	(8) Electric Charge of Drainage Pump			L.S.	L.S.	-	4,116	4,116	
	(9) Electric Charge of Water Treatment Plant for Drainage System			L.S.	L.S.	-	2,286	2,286	
	(10) Installation & Dismantling of Drainage Pipe			L.S.	L.S.	922	240	1,162	
	(11) Operation Cost for Water Treatment Plant			L.S.	L.S.	3,567	836	4,403	
	(12) Transportation of Sludge from Water Treatment Plant			L.S.	L.S.	1,839	450	2,289	
	Subtotal ("(1)"+⋯+"(12)")					**19,766**	**94,850**	**114,616**	
	4-2 Temporary Works of Outside Tunnel								
	(1) Receiving & Distribution Facilities for Electric Supply			L.S.	L.S.	13,001	734	13,735	
	(2) Installation & Dismantling of Water Treatment Plant for Drainage Facilities					20,238	33	20,271	
	(3) Transportation Cost of Equipment			L.S.	L.S.	377	58	435	
	(4) Construction Cost of Tunnel Portal			L.S.	L.S.	898	671	1,569	
	(5) High Tension Power Line	km	5.30	900,000	100,000	4,770	530	5,300	1×10^6Baht/km
	(6) Access Road	m	2,480	2,660	1,140	6,597	2,827	9,424	3.8×10^3Baht/m
	(7) Muck Disposal Treatment	m3	466,000	28	12	13,048	5,592	18,640	40Baht/m3
	(8) Others	L.S.		5.0%	5.0%	2,946	522	3,468	"(1)+⋯+(7)"×5%
	Subtotal ("(1)"+⋯+"(8)")					**61,875**	**10,967**	**72,842**	
	4-3 Subtotal ("4-1"+"4-2")					**81,641**	**105,817**	**187,458**	
5	**Subtotal ("3"+"4")**					**1,156,989**	**326,395**	**1,483,384**	
6	**Overhead Cost ("5"×10%)**	%		10%	10%	**115,699**	**32,640**	**148,339**	
7	**Total Cost ("5"+"6")**					**1,272,688**	**359,035**	**1,631,723**	

(2) Other Cost

The Project cost is composed of the construction cost and the other costs such as the engineering cost, administration cost, land acquisition cost and O/M equipment. Those cost is estimated as follows;

(a) Engineering Cost

The engineering cost is composed of the engineering fee for the detailed design and construction supervision and the expenses for topographical and geological survey in the detailed design stages. Those cost is estimated as shown in Table 11.4.2.(2)-2,3,4,5,6 and summarized as follows.

Table 11.4.2.(2)-1 Engineering Cost

Item	Cost (Million Baht)		
	F/C	L/C	Total
1. Detailed Design Stage			
Engineering Fee	205	169	374
Topographical Survey Cost	-	30	30
Geological Investigation Cost	100	55	155
Sub-total	305	254	559
2. Construction Supervision Stage			
Engineering Fee	1,234	1,311	2,545
Total	1,539	1,565	3,104

(b) Administration Cost

The administration cost is the expenses of government for the implementation of the Project such as the site office, supervision expenses for the Consultant and Contractor, inspection expenses for the monthly payment, several management for the site maintenance during construction, etc. Since the KIN Project is the huge project requiring construction cost of 32,219 million Baht, the administration cost is estimated at 645 million Baht which is equivalent to 2% of the construction cost.

(c) O/M Equipment

The O/M works for the water diversion in the project will not have difficult items. The major maintenance of the Project facility is consisting of the following items;

- Sediment removal by dredging boat at the approach canal in the Kok intake and at the Ing reservoir.
- Road maintenance along the open canal
- Periodical painting and repairing for gate and valves.
- Maintenance for the control house, office and residential quarters.

Those maintenance works will be carried out by employing the contractors in Chiang Rai province except the sediment removal works which will be carried out by the force account basis.

The O/M equipment, therefore will be consisting of mostly vehicles and its cost is estimated at 166 million Baht (Foreign currency)

(d) Land Acquisition and Compensation Cost

The land acquisition and compensation cost is estimated based on the area and unit rate of area to be lost by the Project implementation.

The cost is estimated at 857 million Baht by Thai side and its detail is as shown in the supporting report.

(e) Physical Contingency

The Physical contingency of 10% is applied for the above construction and other cost except the land acquisition cost.

(f) Tax

Tax of 7% is applied for the above construction and other cost including the Physical contingency cost.

Table 11.4.2.(2)-2 Summary of Engineering Cost

Item	F.C.			L.C.			Total Amount (Million Baht)		
	Remuneration	Actual Cost	Total	Remuneration	Actual Cost	Total	Remuneration	Actual Cost	Total
1 Detailed Design									
(1) Engineering Fee	180	25	205	123	46	169	303	71	374
Sub-Total	180	25	205	123	46	169	303	71	374
2 Construction Supervision									
(1) Intake, Weir & Diversion Canal	169	18	187	273	175	448	442	193	635
(2) Kok-Ing No.1 & No.2 Tunnel	139	11	150	57	47	104	196	58	254
(3) Yao Dam & River Training	66	6	72	59	42	101	125	48	173
(4) Ing-Yot No.2 Tunnel,No.1~No.9 Div.	764	61	825	331	327	658	1,095	388	1,483
Sub-Total	1,138	96	1,234	720	591	1,311	1,858	687	2,545
Total	1,318	121	1,439	843	637	1,480	2,161	758	2,919

In addition to the above engineering fee, the following geological and topographical survey cost are required for the detailed design.

(Million Baht)

Item	F.C.	L.C.	Total
1 Geological Survey Works	100	55	155
2 Topographical Survey Works	-	30	30
Total	100	85	185

Table 11.4.2.(2)-3 Engineering Fee for Detailed Design

1.1 Remuneration (36 monthes)

Unit 1,000Baht

Staff	Foreign Currency							Local Currency							Total (1,000Baht)
1. Project Manager	1,000	×	1	Per×	36	×M=	36,000							-	36,000
2. Sub-Manager							-	250	×	1	Per×	36	×M=	9,000	9,000
3. Civil Eng (S)	800	×	2	Per×	30	×M=	48,000	200	×	4	Per×	30	×M=	24,000	72,000
4. Tunnel Eng (S)	800	×	2	Per×	30	×M=	48,000	200	×	2	Per×	30	×M=	12,000	60,000
5. Dam Eng (S)	800	×	1	Per×	20	×M=	16,000	200	×	1	Per×	30	×M=	6,000	22,000
6. Canal Eng (S)							-	180	×	4	Per×	30	×M=	21,600	21,600
7. Geologist (S)	800	×	1	Per×	16	×M=	12,800	180	×	1	Per×	20	×M=	3,600	16,400
8. Soil Mechanist (S)							-	180	×	1	Per×	10	×M=	1,800	1,800
9. Building Eng (S)							-	180	×	2	Per×	15	×M=	5,400	5,400
10. Gate Eng (S)	800	×	1	Per×	8	×M=	6,400	200	×	1	Per×	6	×M=	1,200	7,600
11. Electrical Eng (S)								200	×	1	Per×	12	×M=	2,400	2,400
12. Telemetering (S)	800	×	1	Per×	4	×M=	3,200	200	×	1	Per×	6	×M=	1,200	4,400
13. Cost Estimator (S)	800	×	1	Per×	6	×M=	4,800	180	×	1	Per×	10	×M=	1,800	6,600
14. Spec Writer (S)	800	×	1	Per×	6	×M=	4,800	200	×	2	Per×	10	×M=	4,000	8,800
15. Tender Document (S)								200	×	2	Per×	6	×M=	2,400	2,400
16. Junior Civil Eng (J)								60	×	15	Per×	30	×M=	27,000	27,000
Sub-Total					(M=	**216**	) **180,000**					(M=	**942**	) **123,400**	**303,400**

1.2 Actual Expenses

Unit 1,000Baht

Item	Foreign Currency						Local Currency						Total (1,000Baht)
1 Per Diem at Thai	50	/M	×	216	×M=	10,800							10,800
2 Per Diem at Site						-	20	/M	×	200	M=	4,000	4,000
3 Hotel Charge (B.K.)	60	/M	×	130	×M=	7,800							7,800
4 Hotel Charge (Site)	30	/M	×	86	×M=	2,580	30	/M	×	200	M=	6,000	8,580
5 Air Fee	90	/M	×	30	Times=	2,700							2,700
6 Air Fee (to Site)						-	4	/Times	×	900		3,600	3,600
7 Communication	20	/M	×	36	×M=	720	10	/M	×	36	M=	360	1,080
8 Car Rental at B.K.						-	45	/M×	3 ×	36	M=	4,860	4,860
9 Car Rental at Site						-	40	/M×	8 ×	12	M=	3,840	3,840
10 Office Rental at B.K.						-	200	/M	×	36	M=	7,200	7,200
11 Office Rent at Site						-	50	/M	×	12	M=	600	600
12 Technician						-	30	/M×	6 ×	30	M=	5,400	5,400
13 Office Worker						-	20	/M×	8 ×	30	M=	4,800	4,800
14 Report						-						5,000	5,000
15 Others						-						340	340
Sub-Total						**24,600**						**46,000**	**70,600**

Unit 1,000Baht

Total	**204,600**	**169,400**	**374,000**

Table 11.4.2.(2)-4 Engineering Fee for Construction Supervision

Unit 10^3Baht

Staff	Kok Intake, Ing Weir Kok-Ing Canal, Ing-Yot Canal 48 months, 4 Divisions	Kok Ing Tunnel No.1 & No.2 Tunnel 36 months, 2 Divisions	Yao Dam & River Training 48 months, 1 Division	Ing-Yot No. 2 Tunnel River Training 84 months, 5 Divisions	Total
1. Foreign Expert					
Project Manager	-	B 1000 x 36 M x 2 72,000	-	B 1000 x 84 M x 5 420,000	492,000
Civil Eng	B 800 x 42 M x 4 134,400	-	B 800 x 42 M x 1 33,600	-	168,000
Tunnel Eng	B 800 x 12 M x 1 9,600	B 800 x 36 M x 2 57,600	B 800 x 6 M x 1 4,800	B 800 x 78 M x 5 312,000	384,000
Dam or Weir Eng	B 800 x 18 M x 1 14,400	-	B 800 x 24 M x 1 19,200	-	33,600
Tunnel Geologist	B 800 x 3 M x 1 2,400	B 800 x 12 M x 1 9,600	B 800 x 2 M x 1 1,600	B 800 x 8 M x 5 32,000	45,600
Gate Expert	B 800 x 6 M x 1 4,800	-	B 800 x 6 M x 1 4,800	-	9,600
Telemetering Expert	B 800 x 4 M x 1 3,200	-	B 800 x 2 M x 1 1,600	-	4,800
Subtotal	(211M) 168,800	(156M) 139,200	(82M) 65,600	(850) 764,000	1,137,600
2. Local Expert					
Project Manager	B 250 x 48 M x 4 48,000	-	B 250 x 48 M x 1 12,000	-	60,000
Sub-Manager	-	B 200 x 36 M x 2 14,400	-	B 200 x 84 M x 5 84,000	98,400
Civil Eng	B 200 x 84 M x 4 67,200	-	B 200 x 84 M x 1 16,800	-	84,000
Tunnel Eng	B 200 x 12 M x 1 2,400	B 200 x 66 M x 2 26,400	B 200 x 6 M x 1 1,200	B 200 x 156 M x 5 156,000	186,000
Dam or Weir Eng	B 200 x 24 M x 1 4,800	-	B 200 x 42 M x 1 8,400	-	13,200
Geologist	B 180 x 8 M x 4 5,760	B 180 x 12 M x 1 2,160	B 180 x 24 M x 1 4,320	B 180 x 8 M x 5 7,200	19,440
Canal Eng	B 180 x 144 M x 4 103,680	-	-	-	103,680
Soil Mechanist	-	-	B 180 x 18 M x 1 3,240	-	3,240
Building Eng	B 180 x 24 M x 1 4,320	-	B 180 x 12 M x 1 2,160	-	6,480
Gate Eng	B 200 x 6 M x 1 1,200	-	B 200 x 6 M x 1 1,200	-	2,400
Electrical Eng	B 200 x 6 M x 1 1,200	B 200 x 6 M x 1 1,200	B 200 x 6 M x 1 1,200	B 200 x 8 M x 5 8,000	11,600
Junior Eng	B 60 x 144 M x 4 34,560	B 60 x 108 M x 2 12,960	B 60 x 144 M x 1 8,640	B 60 x 252 M x 5 75,600	131,760
Subtotal	(1,760) 273,120	(438M) 57,120	(390M) 59,160	(2,540M) 330,800	720,200
=	273,100	57,100	59,200	330,800	720,200
Total	(1971) 441,900	(594M) 196,300	(472M) 124,800	(3,390M) 1,094,800	1,857,800

Table 11.4.2.(2)-5 Actual Expenses for Construction Supervision

Unit 10^3Baht

Staff	Kok Intake, Ing Weir Kok-Ing Canal, Ing-Yot Canal 48 months, 4 Divisions	Kok Ing Tunnel No.1 & No.2 Tunnel 36 months, 2 Divisions	Yao Dam & River Training 48 months, 1 Division	Ing-Yot No. 2 Tunnel River Training 84 months, 5 Divisions	Total
1. Foreign Currency					
Foreign Staff					
(1) Per Diem at Thai	฿ 50 /M x 211 M = 10,550	฿ 50 /M x 156 M = 7,800	฿ 50 /M x 82 M = 4,100	฿ 50 /M x 850 M = 42,500	64,950
(2) Air Fee	฿ 90 /M x 30 Times = 2,700	฿ 90 /M x 20 Times = 1,800	฿ 90 /M x 10 Times = 900	฿ 90 /M x 100 Times = 9,000	14,400
(3) Communication	฿ 20 /M x 192 M = 3,840	฿ 20 /M x 36 M = 720	฿ 20 /M x 48 M = 960	฿ 20 /M x 420 M = 8,400	13,920
(4) Others	410	180	40	1,100	1,730
Subtotal	17,500	10,500	6,000	61,000	95,000
2. Local Currency					
Foreign Staff		-			
(1) Per Diem at Site	฿ 20 /M 1,760 M = 35,200	฿ 20 /M 438 M = 8,760	฿ 20 /M x 390 M = 7,800	฿ 20 /M x2,540 M = 50,800	102,560
(2) Charge at Site	฿ 30 /M x 1,971 Times = 59,130	฿ 30 /M x 594 Times = 17,820	฿ 30 /M x 472 Times = 14,160	฿ 30 /M x3,390 Times = 101,700	192,810
(3) Air Fee to Site	฿ 4 /M x 660 M = 2,640	฿ 4 /M x 200 M = 800	฿ 4 /M x 160 M = 640	฿ 4 /M x1,130 M = 4,520	8,600
(4) Communication at Site	฿ 10 /M x 192 M = 1,920	฿ 10 /M x 36 M = 360	฿ 10 /M x 48 M = 480	฿ 10 /M x 420 M = 4,200	6,960
(5) Car Rental at Site	฿ 40 /M x 3 Unit x 192 M 23,040	฿ 40 /M x 3 Unit x 72 M 8,640	฿ 40 /M x 3 Unit x 48 M 5,760	฿ 40 /M x 3 Unit x 420 M 50,400	87,840
(6) Office Rental at Site	฿ 50 /M x 192 M = 9,600	฿ 50 /M x 36 M = 1,800	฿ 50 /M x 48 M = 2,400	฿ 50 /M x 420 M = 21,000	34,800
(7) Technician	฿ 30 /M 770 M = 23,100	฿ 30 /M 140 M = 4,200	฿ 30 /M 190 M = 5,700	฿ 30 /M 1,680 M = 50,400	83,400
(8) Office Worker	฿ 20 /M x 770 M = 15,400	฿ 20 /M x 140 M = 2,800	฿ 20 /M x 190 M = 3,800	฿ 20 /M x1,680 M = 33,600	55,600
(9) Printing	฿ 20 /M x 192 M = 3,840	฿ 20 /M x 72 M = 1,440	฿ 20 /M x 48 M = 960	฿ 20 /M x 420 M = 8,400	14,640
(10) Others	1,130	380	300	1,980	3,790
Subtotal	175,000	47,000	42,000	327,000	591,000
Total	192,500	57,500	48,000	388,000	686,000

Table 11.4.2.(2)-6 Summary of Cost Estimate for Geological Survey Works

Type of Works	Unit	Amount (Baht)
1 Geological Investigation (Shallow Drilling, Weir, Intake and Diversion Canal)		
1.1. Mobilization and Demobilization	LS.	1,140,000
1.2. Boring works	LS.	5,672,500
1.3. In-situ test	LS.	4,759,000
1.4. Laboratory test (physical test)	LS.	68,000
1.5. Reporting	LS.	100,000
Sub total ("1.1."+~+"1.5.")		11,739,500
2 Geological Investigation (Shallow and Deep Drilling, Kok-Ing and Ing-Yot Tunnel)		
2.1. Mobilization and Demobilization	LS.	9,820,000
2.2. Boring works	LS.	47,818,000
2.3. In-situ test	LS.	6,520,000
2.4. Laboratory test (rock test)	LS.	699,400
2.5. Reporting	LS.	700,000
Sub total ("2.1."+~+"2.5.")		65,557,400
3 Geological Investigation (Yao Flood Control Dam and Yao River Training)		
3.1. Mobilization and Demobilization	LS.	2,220,000
3.2. Boring works	LS.	8,308,000
3.3. In-situ test	LS.	4,170,000
3.4. Test pitting and laboratory test	LS.	2,854,000
3.5. Reporting	LS.	500,000
Sub total ("3.1."+~+"3.5.")		18,052,000
4 Electromagnetic Survey (TEM, TDEM)		
4.1. Rental charge	LS.	4,654,500
4.2. Labor charge	LS.	3,062,200
4.3. Engineer for observation of TEM&TDEM	LS.	16,459,400
4.4. Equipment for measurment	LS.	791,200
4.5. Transportation chage (International and domestic)	LS.	818,100
4.6. Depreciation costs of Equipment (including repair & maintenance)		5,206,700
4.7. Reporting (including analysis)	LS.	2,083,400
Sub total ("4.1."+~+"4.7.")		33,075,500
5 Seismic Survey (Refraction Survey)		
5.1. Seismic survey (refraction survey)	LS.	400,000
5.2. Reporting	LS.	10,000
Sub total ("5.1."+"5.2.")		410,000
6 **Sub total ("1"+~+"5")**		128,834,400
7 **Miscellaneous ("6"×20%)**	20%	25,766,900
8 Sub total ("6"+"7")		**155,000,000**
9 Tax ("8" × 7%)	**7%**	**11,000,000**
10 Total ("8"+"9")	**Baht**	**166,000,000**

Table 11.4.2.(2)-7 Cost of O&M Equipment

(Foreign Currency)

No.	Item	Number of Equipment					Unit Rrice	Initial Cost	Remark
		Chiang Rai	Kok Area	Ing Area	Yao Area	Total	(1,000 Baht)	(1,000 Baht)	
1	Truck 2t with Crane 2t	2	-	-	-	2	850	1,700	
2	Lift Truck H=8~9m (for Tunnel Maintenance)	3	-	-	-	3	1,170	3,510	with 8×Light
3	Water Tank Lorry 5.0 m3	1	-	-	-	1	1,450	1,450	
4	Sand Pump ϕ 100 H=25m	-	2	2	2	6	100	600	
5	Sand Pump ϕ 150 H=20m	-	2	2	2	6	130	780	
6	Dredging Boat 500PS	-	1	1	-	2	70,460	140,920	at Kok Intake, Ing Weir
7	Motor Boat	-	1	1	1	3	1,180	3,540	
8	Station Wagon	3	1	1	1	6	830	4,980	
9	Double Cab Truck 1ton	2	-	-	-	2	330	660	
10	Micro Bus	2	-	-	-	2	520	1,040	
11	Motor Cycle	14	4	4	4	26	70	1,820	
12	Movable Telephone	8	2	2	2	14	10	140	
13	Others	-	-	-	-	L.S.	3%	4,830	
14	**Subtotal**	**35**	**13**	**13**	**12**	**73**		**166,000**	
15	**Taxes**						**7%**	**12,000**	
16	**Total (Subtotal+Taxes)**							**178,000**	**(1,000 Baht)**

Table 11.4.2.(2)-8 Summary of Land Acquisition and Compensation Cost

Local Currency

No.	Location	Compensation Cost (Baht)
L-1	Kok-Ing Diversion Route	478,800,000
L-2	Ing-Yot Tunnel Inlet Diversion Route	128,400,000
L-3	Mae Loy River Improvement	2,400,000
L-4	Diversion Ing Weir Area	6,000,000
L-5	Nam Yao Reservoir Development and Resettlement	8,400,000
L-6	Nam Yao River Training Area	27,600,000
L-7	Ing-Yot No.2 Tunnel Adit No.7 Area	8,400,000
L-8	Ing-Yot No.2 Tunnel Muck at Adit No.3,5,9 Area	121,200,000
L-9	Access Road Area	2,400,000
L-10	Canal Area from Outlet of Ing-Yot Tunnel	15,600,000
L-11	Land Allocation Cost for Nam Yao Reservoir Development	21,600,000
L-12	Land Allocation Cost at Ban Pro for Nam Yao River Improvement	21,600,000
L-13	Land Allocation Cost at Wang Phang for Nam Yao River Improvement	14,400,000
Total		**857,000,000**

L-1 Kok-Ing Diversion Route

Item		Compensation Cost (Baht)
L-1.1	Land Acquisition	376,279,960
L-1.2	Crop Compensation	20,536,400
L-1.3	Building Compensation	1,806,780
		398,623,140
	Subtotal ≒	**399,000,000**
	Contingency 20 %	**79,800,000**
	Total	**478,800,000**

L-2 Ing-Yot Tunnel Inlet Diversion Route

Item		Compensation Cost (Baht)
L-2.1	Land Acquisition	103,841,230
L-2.2	Crop Compensation	2,256,500
L-2.3	Building Compensation	144,360
		106,242,090
	Subtotal ≒	**107,000,000**
	Contingency 20 %	**21,400,000**
	Total	**128,400,000**

L-3 Mae Loy River Improvement

Tambon, Ngew, A.Thoeng, Chaing Rai KM. 0+000 to KM. 0+900

Item		Compensation Cost (Baht)
L-3.1	Land Acquisition	1,120,000
L-3.2	Crop Compensation	70,000
L-3.3	Building Compensation	-
		1,190,000
	Subtotal ≒	**2,000,000**
	Contingency 20 %	**400,000**
	Total	**2,400,000**

L-4 Diversion Ing Weir Area

Item		Area (Rai)	Compensation Rate (Baht / Rai)	Compensation cost (Baht)
L-4.1	Land Acquisition	115	40,000	4,600,000
L-4.2	Crop Compensation	-	-	-
L-4.3	Building Compensation	-	-	-
				4,600,000
	Subtotal			**5,000,000**
	Contingency 20 %			**1,000,000**
	Total			**6,000,000**

L-5 Nam Yao Reservoir Development and Resettlement

Item		Area	Compensation Cost (Baht)
L-5.1	Land Acquisition	526 Rai	5,260,000
L-5.2	Crop Compensation		1,160,000
L-5.3	Building Compensation	1 House	91,000
			6,511,000
	Subtotal	≒	7,000,000
	Contingency 20 %		1,400,000
	Total		8,400,000

L-5.1 Land Acquisition cost at Nam Yao Reservoir

Zone	Unit No.	Land Area	Estimated Cost (Baht / Rai)	Impacted Area	(Rai)	Compensation Cost (Baht)
2	3	Land Excluding Unit No. 1 - 2	10,000	Reservoir	501	5,010,000
				Head work	25	250,000
Total						5,260,000

L-5.2.1 Crop Compensation Cost at Nam Yao Reservoir

Land Utilization	Area (Rai)	Crop Compensation Rate (Baht/Rai)	Compensation Cost (Baht)
1. Upland Rice	120	1,000	120,000
2. Upland Crop (Corn)			
- Nam Yao Reservoir	378	1,000	378,000
- Head Work	8	1,000	8,000
3. Fruit Tree			
- Nam Yao Reservoir	3	0	0
- Head Work	17	0	0
4. Vacant Area	1,106	0	0
5. Forest Area	240	0	0
Total	1,872	-	506,000

L-5.2.2 Fruit Tree Compensation Cost at Nam Yao Reservoir

No.	Type	Big size fruit			Medium size fruit			Compensation Cost (Baht)
		Number	Unit cost	Subtotal	Number	Unit cost	Subtotal	
1	Mango	15	1,600	24,000	100	1,300	130,000	154,000
2	Longan			-	10	1,000	10,000	10,000
3	Star Apple			-	1	100	100	100
4	Gra - taun			-	10	600	6,000	6,000
5	Lime			-	70	100	7,000	7,000
6	Kaffir			-	3	200	600	600
7	Pomelo			-	10	1,500	15,000	15,000
8	Teak			-	105	500	52,500	52,500
9	Banana	224	40	8,960	200	20	4,000	12,960
10	Ma kaen			-	170	1,000	170,000	170,000
11	Lichee			-	150	1,500	225,000	225,000
12	Sweet Malod			-	3	25	75	75
Total				32,960			620,275	653,235
							≒	654,000

L-6 Nam Yao River Training Area

Item		Compensation Cost (Baht)
L-6.1	Land Acquisition	19,376,000
L-6.2	Crop Compensation	2,856,000
L-6.3	Building Compensation	-
		22,232,000
	Subtotal ≒	**23,000,000**
	Contingency 20 %	**4,600,000**
	Total	**27,600,000**

L-6.1 Land Compensation Cost at Nam Yao River Training Area

No.	Village	Impacted Area (Rai)	Land Compensation Rate (Baht / Rai)	Compensation Cost (Baht)
1	Ban Song Khwae	76	20,000	1,520,000
2	Ban Mai	52	20,000	1,040,000
3	Ban Hang Thung	44	20,000	880,000
4	Ban Pang Pook	136	20,000	2,720,000
5	Ban Sop Ped	11	12,000	132,000
6	Ban Nam Mong	110	12,000	1,320,000
7	Ban Pang Sa	72	12,000	864,000
8	Ban Wang Phang	42	12,000	504,000
9	Ban Nae 1	33	12,000	396,000
10	Ban Nae 2	39	20,000	780,000
11	Ban Wang Thong	92	20,000	1,840,000
12	Ban Na Nun 1	88	20,000	1,760,000
13	Ban Na Nun 2	7	20,000	140,000
14	Ban Na Nun 3	88	20,000	1,760,000
15	Ban Pu Ka	54	30,000	1,620,000
16	Ban Chiang Rae	70	30,000	2,100,000
Total		1,014	-	**19,376,000**

L-6.2 Crop Compensation Cost at Nam Yao River Training Area

Crop	Area (Rai)	Crop Compensation Rate (Baht/Rai)	Compensation Cost (Baht)
1. Corn	504	1,000	504,000
2. Integrated Orchard	101	-	1,942,960
3. Upland Rice	409	1,000	409,000
Total	1,014	-	2,855,960
		≒	**2,856,000**

L-7 Ing-Yot No.2 Tunnel Adit No.7 Area

Item		Area (Rai)	Compensation cost (Baht)
L-7.1	Land Acquisition	175	4,800,000
L-7.2	Crop Compensation	-	1,400,000
L-7.3	Building Compensation	-	-
		175	6,200,000
	Subtotal	≒	**7,000,000**
	Contingency 20 %		**1,400,000**
	Total		**8,400,000**

L-8 Ing-Yot No.2 Tunnel Muck at Adit No.3,5,9 Area

Item		Compensation cost (Baht)
L-8.1	Land Acquisition	38,450,000
		35,478,880
L-8.2	Crop Compensation	26,640,200
L-8.3	Building Compensation	-
		100,569,080
	Subtotal ≒	**101,000,000**
	Contingency 20 %	**20,200,000**
	Total	**121,200,000**

L-9 Access Road Area

Item		Compensation cost (Baht)
L-9.1	Land	1,341,000
L-9.2	Crops	61,000
L-9.3	Houses	-
		1,402,000
Subtotal	≒	**2,000,000**
Contingency 20 %		**400,000**
Total		**2,400,000**

L-10 Canal Area from Outlet of Ing-Yot Tunnel

Item		Compensation cost (Baht)
L-10.1	Land	2,560,000
L-10.2	Crops	10,240,000
L-10.3	Houses	-
		12,800,000
Subtotal	≒	**13,000,000**
Contingency 20 %		**2,600,000**
Total		**15,600,000**

L-11 Land Allocation Cost for Nam Yao Reservoir Development

Item		Compensation cost (Baht)
L-11.1	Land Improvement and Measurement for Allocation	3,000,000
L-11.2	Infrastructure system Improvement and Development Cost	7,300,000
L-11.3	Irrigation Development Cost	3,000,000
L-11.4	Career Extension and Development Cost	2,350,000
L-11.5	Operation Cost	1,560,000
		17,210,000
	Subtotal ≒	**18,000,000**
	Contingency 20 %	**3,600,000**
	Total	**21,600,000**

L-12 Land Allocation Cost at Ban Pro for Nam Yao River Improvement

Item		Compensation cost (Baht)
L-12.1	Improvement Cost of Measurement for Allocation	4,250,000
L-12.2	Infrastructure system Improvement Cost	1,800,000
L-12.3	Irrigation Development Cost	3,000,000
L-12.4	Career Extension and Development Cost	6,500,000
L-12.5	Operation Cost	1,555,000
		17,105,000
	Subtotal ≒	**18,000,000**
	Contingency 20 %	**3,600,000**
	Total	**21,600,000**

L-13 Land Allocation Cost at Wang Phang for Nam Yao River Improvement

Item		Compensation cost (Baht)
L-13.1	Improvement Cost of Measurement for Allocation	2,062,500
L-13.2	Infrastructure system Improvement Cost	2,100,000
L-13.3	Irrigation Development Cost	3,000,000
L-13.4	Career Extension and Development Cost	3,000,000
L-13.5	Operation Cost	1,016,250
		11,178,750
	Subtotal ≒	**12,000,000**
	Contingency 20 %	**2,400,000**
	Total	**14,400,000**

11.4.3 Other Costs Related to Kok-Ing-Nan Project

The other costs related to Kok-Ing-Nan Project as mentioned in Table 11.4.1.(2) is estimated taking into account the following concept.

(1) Associate Irrigation Project Cost

- The Associate irrigation project in the Kok-Ing basin is consisting of the irrigation facilities such as irrigation main and lateral canals connecting to the Kok-Ing diversion canal, new weirs crossing the Ing river and small scale pumping station along the river and canal. Namely, the project cost does not include the water sources cost but only covers the cost for water distribution facility in the beneficial area.
- The Associate project cost in the lower Nan basin is consisting of mainly floating pump and canal system in the beneficial area. The irrigation water released from the Yao dam in the dry season will be lifted by floating pump and conveyed to the beneficial area by canal system.
- The proposed beneficial area is presently placed at the wet season paddy area under rainfed. The proposed perennial area to be used for fruit and fish pond will be converted from the existing paddy area and will require the land consolidation cost to convert the farm area.

(2) Environmental Impact Mitigation Cost

The surrounding area along the water diversion route of the Project is mostly formed with flat farmland along the river, forest land at high mountain and hilly area and bush and grass land at low hilly area. The environmental impact to the area by the Project implementation is very limited at the area along the open canal because the water diversion route consists of mainly culvert canal and tunnel passing through underground. However, the following mitigation works will be proposed for conservation of water shead and improvement of human life in the Project area. The following facility will be provided by the governmental agencies concerned and managed in cooperation with peoples living in the area.

- Three reforestation centers at Amphoe Chiang Khan, Thoeng and King Amphoe Song Khwae by R.F.D for purpose of forest conservation.
- Three diversified crop centers at Amphoe Phaya Meng Rai, Thoeng and King Amphoe Soeng Khwae by DOE for purpose of research and extension of crop diversification program.
- Two Eco-tourism facilities at the national park area in the Ing-Lao basin and the reserved forest area I near the tunnel outlet in the Yao basin by R.F.D.
- Four hatchery facility at the Kok, lower Ing, and Yao basins by DOF in order to expand the fish culture in the Project area.

- Two animal dispensaries at the lower Ing and Ing-Lao basin by DOL for purpose of cow breading at the plateau area along the tunnel route in the Ing-Lao basin.
- Re settlement of houses, which is very scarce in the Project area, if required in future.

(3) Existing Beneficial Area in Lower Nan and Delta

The perenial area of 377,000 rai in the Delta and 95,000 rai in the lower Nan will be developed by the diversion water of the Project. The perenial area is consisting of the area of sugar cane, fruit and fish pond and will be converted from the existing paddy area. Some land consolidation works will be required for the area conversion from paddy to other crops.

(4) New Beneficial Area in the Lower Nan

In the lower Nan basin, the large irrigation projects of Phitsanulok (2) and pumping irrigation project by DEDP will be newly proposed to use the diversion water of the Project. Those beneficial area is presently under rainfed and will require the irrigation canal and pumping system to use the diversion water. The irrigation main canal in the Phitsanulok (2) will be started at the existing Naresuan barrage and placed at left bank of the lower Nan river, while a number of pumping stations are installed along the Nan and Phichit river.

Data of Construction Cost Estimation

Data of Common Civil Works

Calculation Method for Output of Construction Equipment [Back Data]

1. Swell Factor of Earth Works

List of Swell Factor

Item	Earth & Sand Material	Weathered Rock	Rock	Hard Rock
In Place	1.0 (f= 0.83)	1.0 (f= 0.77)	1.0 (f= 0.67)	1.0 (f= 0.63)
Loose	1.2	1.3	1.5	1.6
Embank	1.2 × 0.75 = 0.9	1.3 × 0.89 = 1.15	1.5 × 0.80 = 1.2	1.6 × 0.78 = 1.25

2. Caluculation Formular

(1) Backhoe & Wheel Loader (Excavation & Loading)

Working Volume (m3/Hr)

Q = (3,600*q*f*E)/Cm (m3/Hr)

q = Equipment Capacity per 1 cycle (m3)

(Revised)

q = q0 * K = (m3)	0.6	× 1.00	=	0.60
	1.2	× 1.00	=	1.20
	2.0	× 1.00	=	2.00
	2.1	× 1.00	=	2.10

f = Swell Factor

E = Working Effency

E : Normal	In Place	Loose
Earth & Sand	0.60	0.65
Weathered Rock & Rock(Stone)	0.45	0.50

Cm = 1 Cycle Time = 30 sec

Q = (3,600*q*f*E)/Cm (m3/Hr) (Revised)

Grade of Construction Equipment	q	f				E : Normal				Cm	Q=(3,600*q*f*E)/Cm (m3/Hr)			
		In Place		Loose		In Place		Loose			In Place		Loose	
		E.&S.	W.R.	E.&S.	W.R.	E.&S	W.R.	E.&S.	W.R.		E.&S.	W.R.	E.&S.	W.R.
Backhoe Shovel 0.6 m3	0.60	1.00	1.00	1.20	1.30	0.60	0.45	0.65	0.50	30	43	32	56	47
Backhoe Shovel 1.2 m3	1.20	1.00	1.00	1.20	1.30	0.60	0.45	0.65	0.50	30	86	65	112	94
Backhoe Shovel 2.0 m3	2.00	1.00	1.00	1.20	1.30	0.60	0.45	0.65	0.50	30	144	108	187	156
Wheel Loader 1.2 m3	1.20	1.00	1.00	1.20	1.30	0.60	0.45	0.65	0.50	30	86	65	112	94
Wheel Loader 2.1 m3	2.10	1.00	1.00	1.20	1.30	0.60	0.45	0.65	0.50	30	151	113	197	164

(2) Bulldozer (Excavation & Transfer)

Working Volume (m3/Hr)

Q = (60*q*f*E)/Cm (m3/Hr)

q = Equipment Capacity per 1 cycle (m3)

(Revised)

Bulldozer Grade (t)	11	15	21	32
q (m3)	1.4	1.8	2.9	4.7

f = Swell Factor

E = Working Effency

E : Normal	In Place	Loose
Earth & Sand	0.75	0.80
Weathered Rock & Rock(Stone)	0.45	0.50

Cm = 1 Cycle Time = 0.025*L+0.7 (min) L = 15 m Cm = 1.08 min (Revised)

Q = (60*q*f*E)/Cm (m3/Hr) (Revised)

Grade of Construction Equipment	q	f				E : Normal				Cm	Q=(60*q*f*E)/Cm (m3/Hr)			
		In Place		Loose		In Place		Loose			In Place		Loose	
		E&S	W.R.	E&S	W.R.	E&S	W.R.	E&S	W.R.		E&S	W.R.	E&S	W.R.
Bulldozer 11t	1.4	1.00	1.00	1.20	1.30	0.75	0.45	0.80	0.50	1.08	58	35	75	51
Bulldozer 15t	1.8	1.00	1.00	1.20	1.30	0.75	0.45	0.80	0.50	1.08	75	45	96	65
Bulldozer 21t	2.9	1.00	1.00	1.20	1.30	0.75	0.45	0.80	0.50	1.08	121	73	155	105
Bulldozer 32t	4.7	1.00	1.00	1.20	1.30	0.75	0.45	0.80	0.50	1.08	196	118	251	170

(3) Ripper Bulldozer (Excavation for Weathered Rock & Rock)

Operation Time

Hs = Hr + 10/Q (hr/10m3)

Hs = Operation Time of Transfer per 10m3 (hr/10m3)

Hr = Operation Time of Excavation per 10m (hr/10m3)

Ripper Bulldozer 32t	Weathered Rock & Rock
(per 10m3)	Hr= 0.08 hr

Q = Excavation & Transfer Working of Ripper Bulldozer per 1.0 Hour (m3/hr)

Grade of Construction Equipment	q	Weathered Rock & Rock			In Place	
		f	E : Normal	Cm	Q=(60*q*f*E)/Cm	(m3/Hr)
Bulldozer 32t	4.7	1.00	0.45	1.08	118	

Hs = Hr + 10/Q =0.08 + 10 / 118 = 0.16 (hr/10m3)

Working Volume (m3/Hr)

Q = 1 / (0.16 / 10) = 63 (m3/Hr)

(4) Rock Breaker 1,300kg with Backhoe 0.6m3 (Excavation for Rock)

Working Volume (m3/Hr)

Q = 1.0 Hr/10m3= 10 m3/Hr for Rock (Revised)

(5) Dump Truck (Transfer) Included the Time for Loading , Unloading ,Waiting ,etc.

Working Volume (m3/Hr)

Q = (60*q*f*E)/Cm (m3/Hr)

q = Equipment Capacity per 1 Dump Truck (In Place : m3)

(Revised)

q (m3)	In Place			rw
Dump Truck Grade (t)	8	11	20	t/m3
Earth & Sand Material	5.0	6.9	12.5	1.6
Weathered Rock	4.0	5.5	10.0	2.0
Rock	3.6	5.0	9.1	2.2

f = Swell Factor

f	In Place	Loose	Embank
Earth & Sand Material	1.0	1.2	0.9
Weathered Rock	1.0	1.3	1.15
Rock	1.0	1.5	1.2

E = Working Effency E = 1.00 (Revised)

Cm = 1 Cycle Time = (L km) / (20~30km/Hr)*60+10 (mi (Revised)

Working Volume (m3/Hr)

Q = (60*q*f*E)/Cm (m3/Hr) (Revised)

Grade of Construction Equipment	Material	q (m3)	f		E	Q = (60*q*f*E)/Cm (m3/Hr) Cm = (L km) / (20~35km/Hr)*60+10 (min)									
						L=	0.5	1	3	5	10	15	20	50	60
Dump Truck 8t	Earth & Sand	5.0	In Place	1.0	1.00		26	23	17	14	9	8	6	3.1	2.7
		5.0	Loose	1.2	1.00		31	28	21	16	11	9	7	3.8	3.2
		5.0	Embank	0.9	1.00		23	21	16	12	8	7	5	2.8	2.4
	Weathered Rock	4.0	In Place	1.0	1.00		21	18	14	11	7	6	5	2.5	2.1
		4.0	Loose	1.3	1.00		27	24	18	14	9	8	6	3.3	2.8
		4.0	Embank	1.15	1.00		24	21	16	13	8	7	6	2.9	2.4
	Rock	3.6	In Place	1.0	1.00		19	17	13	10	6	5	4	2.3	1.9
		3.6	Loose	1.5	1.00		28	25	19	15	10	8	6	3.4	2.9
		3.6	Embank	1.2	1.00		23	20	15	12	8	6	5	2.7	2.3
Dump Truck 11t	Earth & Sand	6.9	In Place	1.0	1.00		36	32	24	19	12	10	8	4.3	3.7
		6.9	Loose	1.2	1.00		43	38	29	23	15	12	10	5.2	4.4
		6.9	Embank	0.9	1.00		32	29	22	17	11	9	7	3.9	3.3
	Weathered Rock	5.5	In Place	1.0	1.00		29	25	19	15	10	8	7	3.4	2.9
		5.5	Loose	1.3	1.00		37	33	25	20	13	11	9	4.5	3.8
		5.5	Embank	1.15	1.00		33	29	22	17	11	9	8	4.0	3.4
	Rock	5.0	In Place	1.0	1.00		26	23	17	14	9	8	6	3.1	2.7
		5.0	Loose	1.5	1.00		39	35	26	20	13	11	9	4.7	4.0
		5.0	Embank	1.2	1.00		31	28	21	16	11	9	7	3.8	3.2
Dump Truck 20t	Earth & Sand	12.5	In Place	1.0	1.00		65	58	44	34	22	19	15	7.8	6.6
		12.5	Loose	1.2	1.00		78	69	52	41	26	23	18	9.4	8.0
		12.5	Embank	0.9	1.00		59	52	39	31	20	17	14	7.1	6.0
	Weathered Rock	10.0	In Place	1.0	1.00		52	46	35	27	18	15	12	6.3	5.3
		10.0	Loose	1.3	1.00		68	60	45	35	23	20	16	8.1	6.9
		10.0	Embank	1.15	1.00		60	53	40	31	20	17	14	7.2	6.1
	Rock	9.1	In Place	1.0	1.00		47	42	32	25	16	14	11	5.7	4.8
		9.1	Loose	1.5	1.00		71	63	48	37	24	20	16	8.6	7.3
		9.1	Embank	1.2	1.00		57	50	38	30	19	16	13	6.8	5.8

(6) Stripping Thickness =0.5m (Bulldozer 11t , 15t , 21t , Backhoe Shovel 0.6m3 , 1.2m3)

a) Bulldozer 11t , 15t , 21t

Working Volume

A = S0 + E (m2/Hr = 0.5m3/Hr)

S0 = Equipment Capacity per 1 hour (m2/Hr = 0.5m3/Hr)

E = Working Effency E = 0.9 (Revised)

(m2/Hr = 0.5m3/Hr)

Bulldozer Grade	Equipment Capacity S0 m2/Hr	E	A m2/Hr = m3/Hr (Revised)	
11 t	210	0.9	189 =	95
15 t	290	0.9	261 =	131
21 t	410	0.9	369 =	185

b) Backhoe Shovel 0.6m3 , 1.2m3 Above-mentioned

Table CL. List of Unit Rate for Common Civil Works

No.	Item	Unit	Foreign Currency	Local Currency	Total	Remark (Situation)
C-1	Site Clearing	Baht/ha	0	34,400	34,400	Ordinary Works
C-2	Stripping at Canal	Baht/m3	53	6	59	Transport Distance 5km
C-3	Excavation of Earth at Canal	Baht/m3	61	7	68	Transport Distance 5km
C-4	Excavation of Earth at Culvert Canal in Dry Season	Baht/m3	46	5	51	Transport Distance 1km
C-5	Excavation of Weather Rock at Culvert Canal	Baht/m3	87	9	96	Transport Distance 1km
C-6	Excavation of Rock at Culvert Canal	Baht/m3	525	31	556	Transport Distance 1km Rock Breaker 1,300kg
C-7	Fill and Backfill at Canal in Dry Season	Baht/m3	48	6	54	Transport Distance 5km
C-8	Plain Concrete Mixing & Transport at Canal	Baht/m3	1,370	666	2,036	Large Capacity 30m3/hr Truck with Crane 20t
C-9	Plain Concrete Mixing & Transport at Canal	Baht/m3	1,331	651	1,982	Large Capacity 45m3/hr Truck with Crane 20t
C-10	Plain Concrete Mixing & Transport at Canal	Baht/m3	1,393	670	2,063	Ordinary Capacity 25m3/hr Truck with Crane 20t
C-11	Structure Concrete Mixing & Transport at Canal	Baht/m3	1,529	972	2,501	Large Capacity 30m3/hr Concrete Pump 30m3/hr
C-12	Form for Structure Concrete Works	Baht/m2	104	401	505	Ordinary Works Truck with Crane 15t
C-13	Reinforced Bar/ton for Structure Concrete Works	Baht/ton	20,691	2,739	23,430	Ordinary Works Truck with Crane 15t
C-14	Stripping at Damsite	Baht/m3	61	11	72	Transport Distance 1km
C-15	Excavation of Earth at Intake, Outlet & Damsite	Baht/m3	62	11	73	Transport Distance 0.5km
C-16	Excavation of Weathered Rock at Intake, Outlet & Damsite	Baht/m3	100	16	116	Transport Distance 0.5km
C-17	Excavation of Rock at Intake, Outlet & Damsite	Baht/m3	238	30	268	Transport Distance 0.5km
C-18	Excavation of Earth at Spillway & Control House Yard	Baht/m3	68	12	80	Transport Distance 1~2km
C-19	Excavation of Weathered Rock at Spillway & Control House Yard	Baht/m3	107	17	124	Transport Distance 1~2km
C-20	Excavation of Rock at Spillway & Control House Yard	Baht/m3	246	32	278	Transport Distance 0.5km
C-21	Embankment of Core at Coffer Dam	Baht/m3	123	20	143	Transport Distance 0.5km
C-22	Embankment of Filter at Coffer & Main Dam	Baht/m3	72	234	306	Transport Distance 60km
C-23	Embankment of Rock at Coffer Dam from I-Y Tunnel	Baht/m3	63	16	79	Transport Distance 10km
C-24	Embankment of Random at Main Dam	Baht/m3	15	5	20	Transport Distance 0.5km
C-25	Embankment of Rock at Main Dam	Baht/m3	13	5	18	Transport Distance 0.5km
C-26	Fill & Backfill at Damsite	Baht/m3	54	13	67	
C-27	Cost of Gate & Valve	L.S.	L.S.	L.S.	L.S.	Refer to C-27
C-28	Monitoring & Control System Equipment Cost	L.S.	L.S.	-	L.S.	Refer to C-28

C-1. Site Clearing

Rate = 34,400 Baht/ha **F.C. = 0 Baht/ha**

Ordinary Works **L.C. = 34,400 Baht/ha**

Items	Unit	Quantity	Foreign Currency		Local Currency		Remark
			Rate	Cost	Rate	Cost	
1. **Labor & Other**							
Common Labor		80 day			180	14,400	
Chainsaw		80 day			250	20,000	
Subtotal						34,400	
2. **Total**				0		34,400	34,400 Baht
3. **Output = 100 ha/day**							
Rate = Baht/ha				**0**	Baht/ha	**34,400**	Baht/ha = **34,400**

C-2. Stripping at Canal

Rate = 59 Baht/m3 F.C. = 53 Baht/m3 90%

L= 5 km L.C. = 6 Baht/m3 10%

Items	Unit	Quantity	Foreign Currency Rate	Foreign Currency Cost	Local Currency Rate	Local Currency Cost	Remark
1. **Operation Cost (Equipment & Fuel)**							
Wheel Loader 2.0 m3	2	20 Hr	1,145	22,900	55	1,100	10 Hr × 2
Bulldozer 21t	3	30 Hr	2,265	67,950	105	3,150	10 Hr × 3
Dump Truck 15 t	6	60 Hr	790	47,400	50	3,000	10 Hr × 6
Subtotal				138,250		7,250	
2. **Labor**							
Foreman		1 day			350	350	
Operator of Heavy	32%	8 day			350	2,800	1.5 day × 5
Driver		9 day			270	2,430	1.5 day × 6
Common Labor		18 day			180	3,240	1.5 day × 12
Subtotal						8,820	
3. **Total**				138,250		16,070	154,320 Baht/day
4. **Output = m3/day**	130 m3/Hr ×		10 Hr	×	2	Units =	2,600 m3/day
Rate = Baht/m3			53 Baht/m3		6	Baht/m3 =	59

59.4

C-3. Excavation of Earth at Canal

Rate = 68 Baht/m3 F.C. = 61 Baht/m3 90%

L= 5 km L.C. = 7 Baht/m3 10%

Items	Unit	Quantity	Foreign Currency Rate	Foreign Currency Cost	Local Currency Rate	Local Currency Cost	Remark
1. **Operation Cost (Equipment & Fuel)**							
Backhoe Shovel 2.0 m3	2	20 Hr	3,010	60,200	190	3,800	10 Hr × 2
Bulldozer 21 t	2	20 Hr	2,265	45,300	105	2,100	10 Hr × 2
Dump Truck 15 t	6	60 Hr	790	47,400	50	3,000	10 Hr × 6
Subtotal				152,900		8,900	
2. **Labor**							
Foreman		1 day			350	350	
Operator of Heavy	30%	6 day			350	2,100	1.5 day × 4
Driver		9 day			270	2,430	1.5 day × 6
Common Labor		18 day			180	3,240	1.5 day × 12
Subtotal						8,120	
3. **Total**				152,900		17,020	169,920 Baht/day
4. **Output = m3/day**	125 m3/Hr ×		10 Hr	×	2	Units =	2,500 m3/day
Rate = Baht/m3			61 Baht/m3		7	Baht/m3 =	68

C-4. Excavation of Earth at Culvert Canal

Rate = 51 Baht/m3 F.C. = 46 Baht/m3

in Dry Season L= 1 km L.C. = 5 Baht/m3

Items	Unit	Quantity	Foreign Currency Rate	Foreign Currency Cost	Local Currency Rate	Local Currency Cost	Remark
1. **Operation Cost (Equipment & Fuel)**							
Backhoe Shovel 2.0 m3	2	20 Hr	3,010	60,200	190	3,800	10 Hr × 2
Bulldozer 21t	2	20 Hr	2,265	45,300	105	2,100	10 Hr × 2
Dump Truck 15 t	4	40 Hr	790	31,600	50	2,000	10 Hr × 4
Subtotal				137,100		7,900	
2. **Labor**							
Foreman		1 day			350	350	
Operator of Heavy	34%	6 day			350	2,100	1.5 day × 4
Driver		6 day			270	1,620	1.5 day × 4
Common Labor		18 day			180	3,240	1.5 day × 12
Subtotal						7,310	
3. **Total**				137,100		15,210	152,310 Baht/day
4. **Output = m3/day**		150 m3/Hr ×		10 Hr	×	2	Units = 3,000 m3/day
Rate = Baht/m3				**46**	Baht/m3	**5**	Baht/m3 = **51**

50.8

C-5. Excavation of Weather Rock at Culvert Canal

Rate = 96 Baht/m3 F.C. = 87 Baht/m3

L= 1 km L.C. = 9 Baht/m3

Items	Unit	Quantity	Foreign Currency Rate	Foreign Currency Cost	Local Currency Rate	Local Currency Cost	Remark
1. **Operation Cost (Equipment & Fuel)**							
Ripper Bulldozer 32 t	4	40 Hr	1,780	71,200	120	4,800	10 Hr × 4
Backhoe Shovel 2.0 m3	2	20 Hr	3,010	60,200	190	3,800	10 Hr × 2
Bulldozer 21 t	2	20 Hr	2,265	45,300	105	2,100	10 Hr × 2
Dump Truck 15 t	4	40 Hr	790	31,600	50	2,000	10 Hr × 4
Subtotal				208,300		12,700	
2. **Labor**							
Foreman		2 day			350	700	
Operator of Heavy	43%	12 day			350	4,200	1.5 day × 8
Driver		6 day			270	1,620	1.5 day × 4
Common Labor		18.0 day			180	3,240	1.5 day × 12
Subtotal						9,760	
3. **Total**				208,300		22,460	230,760 Baht/day
4. **Output = m3/day**		60 m3/Hr ×		10 Hr	×	4	Units = 2,400 m3/day
Rate = Baht/m3				**87**	Baht/m3	**9**	Baht/m3 = **96**

C-6. Excavation of Rock at Culvert Canal

Rock Breaker 1,300kg — Rate = 556 Baht/m3 (F.C. = 525 Baht/m3, L.C. = 31 Baht/m3) — L= 1 km

Items	Unit	Quantity	Foreign Currency Rate	Foreign Currency Cost	Local Currency Rate	Local Currency Cost	Remark
1. Operation Cost (Equipment & Fuel)							
Rock Breaker 1,300kg	6	60 Hr	3,595	215,700	75	4,500	10 Hr × 6
Backhoe Shovel 2.0 m3	1	10 Hr	3,010	30,100	190	1,900	10 Hr × 1
Bulldozer 21t	2	20 Hr	2,265	45,300	105	2,100	10 Hr × 2
Dump Truck 15 t	3	30 Hr	790	23,700	50	1,500	10 Hr × 3
Subtotal				314,800		10,000	
2. Labor							
Foreman		2 day			350	700	
Operator of Heavy	62%	13.5 day			350	4,725	1.5 day × 9
Driver		4.5 day			270	1,215	1.5 day × 3
Common Labor		12 day			180	2,160	1.5 day × 8
Subtotal						8,800	
3. Total				314,800		18,800	333,600 Baht/day
4. Output = m3/day		10 m3/Hr ×		10 Hr	×	6	Units = 600 m3/day
Rate = Baht/m3				525 Baht/m3		31	Baht/m3 = 556

556.0

C-7. Fill and Backfill at Canal

in Dry Season — Rate = 54 Baht/m3 (F.C. = 48 Baht/m3, L.C. = 6 Baht/m3) — L= 5 km

Items	Unit	Quantity	Foreign Currency Rate	Foreign Currency Cost	Local Currency Rate	Local Currency Cost	Remark
1. Operation Cost (Equipment & Fuel)							
Wheel Loader 2.0 m3	2	20 Hr	1,145	22,900	55	1,100	10 Hr × 2
Bulldozer 21 t	2	20 Hr	2,265	45,300	105	2,100	10 Hr × 2
Dump Truck 15 t	6	60 Hr	790	47,400	50	3,000	10 Hr × 6
Subtotal				115,600		6,200	
2. Labor							
Foreman		1 day			350	350	
Operator of Heavy	28%	6 day			350	2,100	1.5 day × 4
Driver		9 day			270	2,430	1.5 day × 6
Common Labor		21.0 day			180	3,780	1.5 day × 14
Subtotal						8,660	
3. Total				115,600		14,860	130,460 Baht/day
4. Output = m3/day		120 m3/Hr ×		10 Hr	×	2	Units = 2,400 m3/day
Rate = Baht/m3				48 Baht/m3		6	Baht/m3 = 54

C-8. Plain Concrete Mixing & Transport at Canal

Truck with Crane 20t — **Rate = 2,036 Baht/m3** — **F.C. = 1,370 Baht/m3**

Large Capacity 30m3/Hr — **L.C. = 666 Baht/m3**

Items	Unit	Quantity	Foreign Currency Rate	Foreign Currency Cost	Local Currency Rate	Local Currency Cost	Remark
1. **Operation Cost (Equipment & Fuel)**							
Concrete Plant 1.0*2 m3 (30m3/Hr	1	10 Hr	1,780	17,800	20	200	10 Hr × 1
Agitator Car (Truck Mixer) 4.5m3	9	90 Hr	570	51,300	70	6,300	10 Hr × 9
Truck with Crane 20t	6	60 Hr	1,635	98,100	35	2,100	10 Hr × 6
Subtotal				167,200		8,600	
2. **Material**							
Portland Cement Type I		90 ton	1,036	93,240	444	39,960	0.30 kg/m3 × 300
Gravel		300 m3	0	0	220	66,000	1.00 m3/m3 × 300
Fine Sand for Aggregate		165 m3	0	0	220	36,300	0.55 m3/m3 × 300
Concrete Admixture		360 liter	418	150,480	22	7,920	1.20 liter/m3 × 300
Subtotal				243,720		150,180	
3. **Labor**							
Foreman		1 day			350	350	
Operator of Heavy	10%	10.5 day			350	3,675	1.5 day × 7
Driver		13.5 day			270	3,645	1.5 day × 9
Concrete Worker		18.0 day			250	4,500	1.5 day × 12
Common Labor		108 day			180	19,440	1.5 day × 72
Miscellaneous		30 %				9,483	31,610 Baht/day
Subtotal						41,093	
4. **Total**				410,920		199,873	610,793 Baht/day
5. **Output = m3/day**		30 m3/Hr ×		10 Hr	×	1	Units = 300 m3/day
Rate = Baht/m3				**1,370** Baht/m3		**666** Baht/m3 =	**2,036**

2,036.0

C-9. Plain Concrete Mixing & Transport at Canal

Truck with Crane 20t — **Rate = 1,982 Baht/m3** — **F.C. = 1,331 Baht/m3**

Large Capacity 45m3/Hr — **L.C. = 651 Baht/m3**

Items	Unit	Quantity	Foreign Currency Rate	Foreign Currency Cost	Local Currency Rate	Local Currency Cost	Remark
1. **Operation Cost (Equipment & Fuel)**							
Concrete Plant 0.75*3m3(45m3/Hr	1	10 Hr	2,865	28,650	25	250	10 Hr × 1
Agitator Car (Truck Mixer) 4.5m3	13	130 Hr	570	74,100	70	9,100	10 Hr × 13
Truck with Crane 20t	8	80 Hr	1,635	130,800	35	2,800	10 Hr × 8
Subtotal				233,550		12,150	
2. **Material**							
Portland Cement Type I		135 ton	1,036	139,860	444	59,940	0.30 kg/m3 × 450
Gravel		450 m3	0	0	220	99,000	1.00 m3/m3 × 450
Fine Sand for Aggregate		248 m3	0	0	220	54,450	0.55 m3/m3 × 450
Concrete Admixture		540 liter	418	225,720	22	11,880	1.20 liter/m3 × 450
Subtotal				365,580		225,270	
3. **Labor**							
Foreman		2 day			350	700	
Operator of Heavy	10%	13.5 day			350	4,725	1.5 day × 9
Driver		19.5 day			270	5,265	1.5 day × 13
Concrete Worker		24.0 day			250	6,000	1.5 day × 16
Common Labor		144 day			180	25,920	1.5 day × 96
Miscellaneous		30 %				12,783	42,610 Baht/day
Subtotal						55,393	
4. **Total**				599,130		292,813	891,943 Baht/day
5. **Output = m3/day**		45 m3/Hr ×		10 Hr	×	1	Units = 450 m3/day
Rate = Baht/m3				**1,331** Baht/m3		**651** Baht/m3 =	**1,982**

C-10. Plain Concrete Mixing & Transport at Canal

Truck with Crane 20t — Rate = 2,063 Baht/m3 — F.C. = 1,393 Baht/m3
Ordinary Capacity 25m3/Hr — L.C. = 670 Baht/m3

Items	Unit	Quantity	Foreign Currency Rate	Foreign Currency Cost	Local Currency Rate	Local Currency Cost	Remark
1. **Operation Cost (Equipment & Fuel)**							
Concrete Plant 1.0*2m3 (25m3/Hr)	1	10 Hr	1,780	17,800	20	200	10 Hr × 1
Agitator Car (Truck Mixer) 4.5m3	8	80 Hr	570	45,600	70	5,600	10 Hr × 8
Truck with Crane 20t	5	50 Hr	1,635	81,750	35	1,750	10 Hr × 5
Subtotal				145,150		7,550	
2. **Material**							
Portland Cement Type I		75 ton	1,036	77,700	444	33,300	0.3 kg/m3 × 250
Gravel		250 m3	0	0	220	55,000	1.0 m3/m3 × 250
Fine Sand for Aggregate		138 m3	0	0	220	30,250	0.6 m3/m3 × 250
Concrete Admixture		300 liter	418	125,400	22	6,600	1.2 liter/m3 × 250
Subtotal				203,100		125,150	
3. **Labor**							
Foreman		1 day			350	350	
Operator of Heavy	10%	9.0 day			350	3,150	1.5 day × 6
Driver		12.0 day			270	3,240	1.5 day × 8
Concrete Worker		15.0 day			250	3,750	1.5 day × 10
Common Labor		90 day			180	16,200	1.5 day × 60
Miscellaneous		30 %				8,007	26,690 Baht/day
Subtotal						34,697	
4. **Total**				348,250		167,397	515,647 Baht/day
5. **Output = m3/day**		25 m3/Hr ×	10 Hr	×	1	Units =	250 m3/day
Rate = Baht/m3			1,393	Baht/m3	670	Baht/m3 =	2,063

2,063

C-11. Structure Concrete Mixing & Transport at Canal

Concrete Pump 30m3/Hr — Rate = 2,501 Baht/m3 — F.C. = 1,529 Baht/m3
Large Capacity 30m3/Hr — L.C. = 972 Baht/m3

Items	Unit	Quantity	Foreign Currency Rate	Foreign Currency Cost	Local Currency Rate	Local Currency Cost	Remark
1. **Operation Cost (Equipment & Fuel)**							
Concrete Plant 1.0*2m3(30m3/h)	1	10 Hr	1,780	17,800	20	200	10 Hr × 1
Concrete Pump 30m3/h	1	10 Hr	785	7,850	35	350	10 Hr × 1
Agitator Car (Tr. Mixer) 4.5m3	9	90 Hr	570	51,300	70	6,300	10 Hr × 9
Subtotal				76,950		6,850	
2. **Material**							
Portland Cement Type II		120 ton	1,666	199,920	714	85,680	0.40 kg/m3 × 300
Gravel		360 m3	0	0	220	79,200	1.20 m3/m3 × 300
Fine Sand for Aggregate		195 m3	0	0	220	42,900	0.65 m3/m3 × 300
Concrete Admixture		435 liter	418	181,830	22	9,570	1.45 liter/m3 × 300
Subtotal				381,750		217,350	
3. **Labor**							
Foreman		1 day			350	350	
Operator of Heavy	2%	3.0 day			350	1,050	1.5 day × 2
Driver		13.5 day			270	3,645	1.5 day × 9
Concrete Worker		30.0 day			250	7,500	1.5 day × 20
Common Labor		180.0 day			180	32,400	1.5 day × 120
Miscellaneous		50 %				22,473	44,945 Baht/day
Subtotal						67,418	
4. **Total**				458,700		291,618	750,318 Baht/day
5. **Output = m3/day**		30 m3/Hr ×	10 Hr	×	1	Units =	300 m3/day
Rate = Baht/m3			1,529	Baht/m3	972	Baht/m3 =	2,501

C-12. Form for Structure Concrete Works

Truck with Crane 15t — **Rate =** 505 Baht/m2 — **F.C. =** 104 Baht/m2

Ordinary Works — **L.C. =** 401 Baht/m2

Items	Unit	Quantity	Foreign Currency Rate	Foreign Currency Cost	Local Currency Rate	Local Currency Cost	Remark
1. **Operation Cost (Equipment & Fuel)**							
Truck with Crane 15t	1	10 Hr	1,035	10,350	35	350	10 Hr × 1
Subtotal				10,350		350	
2. **Material**							
Wood for Form		100 m2	0	0	160	16,000	
Miscellaneous		50 %				8,000	16,000 Baht/day
Subtotal				0		24,000	
3. **Labor**							
Foreman		1 day			350	350	
Operator of Heavy	6%	1.5 day			350	525	1.5 day × 1
Form-work Labor (Carpenter)		22.5 day			300	6,750	1.5 day × 15
Common Labor		45.0 day			180	8,100	1.5 day × 30
Subtotal						15,725	
4. **Total**				10,350		40,075	50,425 Baht/day
5. **Output = 100 m2/day**							10 Hr/day 100 m2/day
Rate = Baht/m2				**104** Baht/m2		**401** Baht/m2 =	**505**

504.3

C-13. Reinforced Bar/ton for Structure Concrete Works

Truck with Crane 15t — **Rate =** 23,430 Baht/ton — **F.C. =** 20,691 Baht/ton

Ordinary Works — **L.C. =** 2,739 Baht/ton

Items	Unit	Quantity	Foreign Currency Rate	Foreign Currency Cost	Local Currency Rate	Local Currency Cost	Remark
1. **Operation Cost (Equipment & Fuel)**							
Truck with Crane 15t	1	10 Hr	1,035	10,350	35	350	10 Hr × 1
Subtotal				10,350		350	
2. **Material**							
Reinforced Bar D16~D25		10 ton	13,104	131,040	1,456	14,560	
Miscellaneous		50 %		65,520		7,280	Baht/day
Subtotal				196,560		21,840	
3. **Labor**							
Foreman		1 day			350	350	
Operator of Heavy	17%	1.5 day			350	525	1.5 day × 1
Steel Worker (Bender/Fixer)		6.0 day			270	1,620	1.5 day × 4
Common Labor		15.0 day			180	2,700	1.5 day × 10
Subtotal						5,195	
4. **Total**				206,910		27,385	234,295 Baht/day
5. **Output = ton/day**							10 Hr/day 10 ton/day
Rate = Baht/ton				**20,691** Baht/ton		**2,739** Baht/ton =	**23,430**

C-14. Stripping at Damsite

Rate = 72 Baht/m3 F.C. = 61 Baht/m3

L= 1 km L.C. = 11 Baht/m3

Items	Unit	Quantity	Foreign Currency Rate	Foreign Currency Cost	Local Currency Rate	Local Currency Cost	Remark
1. **Operation Cost (Equipment & Fuel)**							
Wheel Loader 1.5 m3	1	10 Hr	870	8,700	50	500	10 Hr × 1
Bulldozer 21t	1	10 Hr	2,265	22,650	105	1,050	10 Hr × 1
Dump Truck 11 t	3	30 Hr	580	17,400	50	1,500	10 Hr × 3
Subtotal				48,750		3,050	
2. **Labor**							
Foreman		1 day			350	350	
Operator of Heavy	24%	3.0 day			350	1,050	1.5 day × 2
Driver		4.5 day			270	1,215	1.5 day × 3
Common Labor		18.0 day			180	3,240	1.5 day × 12
Subtotal						5,855	
3. **Total**				48,750		8,905	57,655 Baht/day
4. **Output = m3/day**		80 m3/Hr ×		10 Hr	×	1	Units = 800 m3/day
Rate = Baht/m3				61	Baht/m3	11	Baht/m3 = 72

72.1

C-15. Excavation of Earth at Intake, Outlet & Damsite

Rate = 73 Baht/m3 F.C. = 62 Baht/m3

L= 0.5 km L.C. = 11 Baht/m3

Items	Unit	Quantity	Foreign Currency Rate	Foreign Currency Cost	Local Currency Rate	Local Currency Cost	Remark
1. **Operation Cost (Equipment & Fuel)**							
Backhoe Shovel 1.2 m3	1	10 Hr	1,555	15,550	115	1,150	10 Hr × 1
Bulldozer 21 t	1	10 Hr	2,265	22,650	105	1,050	10 Hr × 1
Dump Truck 11 t	3	30 Hr	580	17,400	50	1,500	10 Hr × 3
Subtotal				55,600		3,700	
2. **Labor**							
Foreman		1 day			350	350	
Operator of Heavy	24%	3 day			350	1,050	1.5 day × 2
Driver		4.5 day			270	1,215	1.5 day × 3
Common Labor		18 day			180	3,240	1.5 day × 12
Subtotal						5,855	
3. **Total**				55,600		9,555	65,155 Baht/day
4. **Output = m3/day**		90 m3/Hr ×		10 Hr	×	1	Units = 900 m3/day
Rate = Baht/m3				62	Baht/m3	11	Baht/m3 = 73

C-16. Excavation of Weathered Rock at Intake, Outlet & Damsite

Rate = 116 Baht/m3 F.C. = 100 Baht/m3

L= 0.5 km L.C. = 16 Baht/m3

Items	Unit	Quantity	Foreign Currency Rate	Foreign Currency Cost	Local Currency Rate	Local Currency Cost	Remark
1. **Operation Cost (Equipment & Fuel)**							
Ripper Bulldozer 21 t	2	20 Hr	1,200	24,000	90	1,800	10 Hr × 2
Backhoe Shovel 1.2 m3	1	10 Hr	1,555	15,550	115	1,150	10 Hr × 1
Bulldozer 21 t	1	10 Hr	2,265	22,650	105	1,050	10 Hr × 1
Dump Truck 11 t	3	30 Hr	580	17,400	50	1,500	10 Hr × 3
Subtotal				79,600		5,500	
2. **Labor**							
Foreman		1 day			350	350	
Operator of Heavy	35%	6 day			350	2,100	1.5 day × 4
Driver		4.5 day			270	1,215	1.5 day × 3
Common Labor		18.0 day			180	3,240	1.5 day × 12
Subtotal						6,905	
3. **Total**				79,600		12,405	92,005 Baht/day
4. **Output = m3/day**		80 m3/Hr ×	10	Hr	×	1	Units = 800 m3/day
Rate = Baht/m3				**100**	Baht/m3	**16**	Baht/m3 = **116**

115.0

C-17. Excavation of Rock at Intake, Outlet & Damsite

Rate = 268 Baht/m3 F.C. = 238 Baht/m3

L= 0.5 km L.C. = 30 Baht/m3

Items	Unit	Quantity	Foreign Currency Rate	Foreign Currency Cost	Local Currency Rate	Local Currency Cost	Remark
1. **Operation Cost (Equipment & Fuel)**							
Crawler Drill 150kg	4	40 Hr	2,745	109,800	25	1,000	10 Hr × 4
Backhoe Shovel 1.2 m3	1	10 Hr	1,555	15,550	115	1,150	10 Hr × 1
Bulldozer 21t	1	10 Hr	2,265	22,650	105	1,050	10 Hr × 1
Dump Truck 11 t	3	30 Hr	580	17,400	50	1,500	10 Hr × 3
Subtotal				165,400		4,700	
2. **Material**							
Dynamite		3.0 kg	130	390	0	0	Baht/day
Detonator		10 P.C.	30	300	0	0	Baht/day
Miscellaneous		30 %		207		0	Baht/day
Subtotal				897		0	
3. **Labor**							
Foreman		3 day			350	1,050	
Operator of Heavy	25%	9.0 day			350	3,150	1.5 day × 6
Driver		4.5 day			270	1,215	1.5 day × 3
Skilled Labor		15.0 day			200	3,000	1.5 day × 10
Common Labor		45.0 day			180	8,100	1.5 day × 30
Subtotal						16,515	
4. **Total**				166,297		21,215	187,512 Baht/day
5. **Output = m3/day**		70 m3/Hr ×	10	Hr	×	1	Units = 700 m3/day
Rate = Baht/m3				**238**	Baht/m3	**30**	Baht/m3 = **268**

C-18. Excavation of Earth at Spillway & Control House Yard

Rate = 80 Baht/m3 F.C. = 68 Baht/m3

L= 1~2 km L.C. = 12 Baht/m3

Items	Unit	Quantity	Foreign Currency Rate	Foreign Currency Cost	Local Currency Rate	Local Currency Cost	Remark
1. Operation Cost (Equipment & Fuel)							
Backhoe Shovel 1.2 m3	1	10 Hr	1,555	15,550	115	1,150	10 Hr × 1
Bulldozer 21 t	1	10 Hr	2,265	22,650	105	1,050	10 Hr × 1
Dump Truck 11 t	4	40 Hr	580	23,200	50	2,000	10 Hr × 4
Subtotal				61,400		4,200	
2. Labor							
Foreman		1 day			350	350	
Operator of Heavy		3 day			350	1,050	1.5 day × 2
Driver		6.0 day			270	1,620	1.5 day × 4
Common Labor		18 day			180	3,240	1.5 day × 12
Subtotal						6,260	
3. **Total**				61,400		10,460	71,860 Baht/day
4. **Output = m3/day**		90 m3/Hr ×		10 Hr	×	1	Units = 900 m3/day
Rate = Baht/m3				**68**	Baht/m3	**12**	Baht/m3 = **80**

79.8

C-19. Excavation of Weathered Rock at Spillway & Control House Yard

Rate = 124 Baht/m3 F.C. = 107 Baht/m3

L= 1~2 km L.C. = 17 Baht/m3

Items	Unit	Quantity	Foreign Currency Rate	Foreign Currency Cost	Local Currency Rate	Local Currency Cost	Remark
1. Operation Cost (Equipment & Fuel)							
Ripper Bulldozer 21 t	2	20 Hr	1,200	24,000	90	1,800	10 Hr × 2
Backhoe Shovel 1.2 m3	1	10 Hr	1,555	15,550	115	1,150	10 Hr × 1
Bulldozer 21 t	1	10 Hr	2,265	22,650	105	1,050	10 Hr × 1
Dump Truck 11 t	4	40 Hr	580	23,200	50	2,000	10 Hr × 4
Subtotal				85,400		6,000	
2. Labor							
Foreman		1 day			350	350	
Operator of Heavy		6.0 day			350	2,100	1.5 day × 4
Driver		6.0 day			270	1,620	1.5 day × 4
Common Labor		18.0 day			180	3,240	1.5 day × 12
Subtotal						7,310	
3. **Total**				85,400		13,310	98,710 Baht/day
4. **Output = m3/day**		80 m3/Hr ×		10 Hr	×	1	Units = 800 m3/day
Rate = Baht/m3				**107**	Baht/m3	**17**	Baht/m3 = **124**

C-20. Excavation of Rock at Spillway & Control House Yard

Rate = 278 Baht/m3 F.C. = 246 Baht/m3

L= 0.5 km L.C. = 32 Baht/m3

Items	Unit	Quantity	Foreign Currency Rate	Foreign Currency Cost	Local Currency Rate	Local Currency Cost	Remark
1. **Operation Cost (Equipment & Fuel)**							
Crawler Drill 150kg	4	40 Hr	2,745	109,800	25	1,000	10 Hr × 4
Backhoe Shovel 1.2 m3	1	10 Hr	1,555	15,550	115	1,150	10 Hr × 1
Bulldozer 21t	1	10 Hr	2,265	22,650	105	1,050	10 Hr × 1
Dump Truck 11 t	4	40 Hr	580	23,200	50	2,000	10 Hr × 4
Subtotal				171,200		5,200	
2. **Material**							
Dynamite		3.0 kg	130	390	0	0	Baht/day
Detonator		10 P.C.	30	300	0	0	Baht/day
Miscellaneous		30 %		207		0	Baht/day
Subtotal				897		0	
3. **Labor**							
Foreman		3 day			350	1,050	
Operator of Heavy	25%	9.0 day			350	3,150	1.5 day × 6
Driver		6.0 day			270	1,620	1.5 day × 4
Skilled Labor		15.0 day			200	3,000	1.5 day × 10
Common Labor		45.0 day			180	8,100	1.5 day × 30
Subtotal						16,920	
4. **Total**				172,097		22,120	194,217 Baht/day
5. **Output = m3/day**		70 m3/Hr ×	10	Hr	×	1	Units = 700 m3/day
Rate = Baht/m3				**246**	Baht/m3	**32**	Baht/m3 = **278**

C-21. Embankment of Core at Coffer Dam

Rate = 143 Baht/m3 F.C. = 123 Baht/m3

L= 0.5 km L.C. = 20 Baht/m3

Items	Unit	Quantity	Foreign Currency Rate	Foreign Currency Cost	Local Currency Rate	Local Currency Cost	Remark
1. **Operation Cost (Equipment & Fuel)**							
(1) **Material Transportation**							
Backhoe Shovel 1.2 m3	1	7.0 Hr	1,555	10,885	115	805	7 Hr × 1
Bulldozer 15t	1	7.0 Hr	1,370	9,590	70	490	7 Hr × 1
Dump Truck 11t	3	21.0 Hr	580	12,180	50	1,050	7 Hr × 3
(2) **Spreading & Compaction**							
Bulldozer 15t	1	7.0 Hr	1,370	9,590	70	490	7 Hr × 1
Tamping Roller 20 t	1	7.0 Hr	2,265	15,855	65	455	7 Hr × 1
Bulldozer 21 t	0.5	3.5 Hr	2,265	7,928	105	368	7 Hr × 0.5
Water Tank Lorry 5.0 m3	1	7.0 Hr	420	2,940	20	140	7 Hr × 1
Subtotal				68,968		3,798	
2. **Labor**							
(1) **Material Transportation**							
Foreman		1.0 day			350	350	
Operator of Heavy		2.0 day			350	700	day × 2
Driver		3.0 day			270	810	day × 3
Common Labor		8.0 day			180	1,440	day × 8
(2) **Spreading & Compaction**							
Foreman		1.0 day			350	350	
Operator of Heavy		3.0 day			350	1,050	day × 3
Driver		1.0 day			270	270	day × 1
Common Labor		12.0 day			180	2,160	day × 12
Subtotal						7,130	
3. **Total**				68,968		10,928	79,896 Baht/day
4. **Output = m3/day**		80 m3/Hr ×	7	Hr	×	1	Units = 560 m3/day
Rate = Baht/m3				**123**	Baht/m3	**20**	Baht/m3 = **143**

C-22. Embankment of Filter at Coffer & Main Dam

Rate = 306 Baht/m3 F.C. = 72 Baht/m3

L= 60.0 km L.C. = 234 Baht/m3

Items	Unit	Quantity	Foreign Currency Rate	Foreign Currency Cost	Local Currency Rate	Local Currency Cost	Remark
1. **Operation Cost (Equipment & Fuel)**							
(1) **Material Transportation**							day × 2 Times
Wheel Loader 1.2 m3	2	14.0 Hr	520	7,280	40	560	7 Hr × 2
Bulldozer 15t	2	14.0 Hr	1,370	19,180	70	980	7 Hr × 2
Dump Truck 11t	8	56.0 Hr	580	32,480	50	2,800	7 Hr × 8
(2) **Spreading & Compaction**							
Vibrating Roller 5t	1	7.0 Hr	515	3,605	15	105	7 Hr × 1
Bulldozer 21 t	0.5	3.5 Hr	2,265	7,928	105	368	7 Hr × 0.5
Subtotal				70,473		4,813	
2. **Material**							
Coarse Sand (Gravel)		980 m3	0	0	220	215,600	
Subtotal				0		215,600	
3. **Labor**							
(1) **Material Transportation**							
Foreman		1.0 day			350	350	
Operator of Heavy		4.0 day			350	1,400	1.5 day × 4
Driver		8.0 day			270	2,160	1.5 day × 8
Common Labor		10.0 day			180	1,800	1.5 day × 10
(2) **Spreading & Compaction**					0	0	
Foreman		1.0 day			350	350	
Operator of Heavy		2.0 day			350	700	day × 2
Common Labor		10.0 day			180	1,800	day × 10
Subtotal						8,560	
4. **Total**				70,473		228,973	299,446 Baht/day
5. **Output = m3/day**	140 m3/Hr	×	7 Hr	×	1	Units =	980 m3/day
Rate = Baht/m3			**72** Baht/m3		**234**	Baht/m3 =	**306**

C-23. Embankment of Rock at Coffer Dam from Tunnel

Rate = 79 Baht/m3 F.C. = 63 Baht/m3

L= 10.0 km L.C. = 16 Baht/m3

Items	Unit	Quantity	Foreign Currency Rate	Foreign Currency Cost	Local Currency Rate	Local Currency Cost	Remark
1. Operation Cost (Equipment & Fuel)							
(1) Material Transportation							
Wheel Loader 2.0 m3	1	7.0 Hr	1,145	8,015	55	385	7 Hr × 1
Bulldozer 21 t	0.5	3.5 Hr	2,265	7,928	105	368	7 Hr × 0.5
Dump Truck 11t	5	35.0 Hr	580	20,300	50	1,750	7 Hr × 5
(2) Material Compaction							
Bulldozer 21 t	0.5	3.5 Hr	2,265	7,928	105	368	7 Hr × 0.5
Subtotal				44,171		2,871	
2. Labor							
(1) Material Transportation							
Foreman		1.0 day			350	350	
Operator of Heavy		1.5 day			350	525	day × 1.5
Driver		5.0 day			270	1,350	day × 5
Common Labor		10.0 day			180	1,800	day × 10
(2) Material Compaction							
Foreman		1.0 day			350	350	
Operator of Heavy		1.0 day			350	350	day × 1
Common Labor		20.0 day			180	3,600	day × 20
Subtotal						8,325	
3. Total				44,171		11,196	55,367 Baht/day
4. Output = m3/day	100 m3/Hr ×		7 Hr	×	1	Units =	700 m3/day
Rate = Baht/m3			63	Baht/m3	16	Baht/m3 =	79

C-24. Embankment of Random at Main Dam

Rate = 20 Baht/m3 F.C. = 15 Baht/m3

L= 0.5 km L.C. = 5 Baht/m3

Items	Unit	Quantity	Foreign Currency Rate	Foreign Currency Cost	Local Currency Rate	Local Currency Cost	Remark
1. **Operation Cost (Equipment & Fuel)**							
Material Compaction							
Bulldozer 21 t	1	7.0 Hr	2,265	15,855	105	735	7 Hr × 1
Tire Roller 20t	1	7.0 Hr	670	4,690	30	210	7 Hr × 1
Subtotal				20,545		945	
2. **Labor**							
Foreman		1.0 day			350	350	
Operator of Heavy		2.0 day			350	700	day × 2
Common Labor		25.0 day			180	4,500	day × 25
Subtotal						5,550	
3. **Total**				20,545		6,495	27,040 Baht/day
4. **Output = m3/day**		200 m3/Hr ×	7 Hr	×	1	Units =	1,400 m3/day
Rate = Baht/m3			15	Baht/m3	5	Baht/m3 =	**20**
							19% 19.3

C-25. Embankment of Rock at Main Dam

Rate = 18 Baht/m3 F.C. = 13 Baht/m3

L= 0.5 km L.C. = 5 Baht/m3

Items	Unit	Quantity	Foreign Currency Rate	Foreign Currency Cost	Local Currency Rate	Local Currency Cost	Remark
1. **Operation Cost (Equipment & Fuel)**							
Material Spreading & Compaction							
Bulldozer 21 t	1	7.0 Hr	2,265	15,855	105	735	7 Hr × 1
Subtotal				15,855		735	
2. **Labor**							
Foreman		1.0 day			350	350	
Operator of Heavy		1.0 day			350	350	day × 1
Common Labor		25.0 day			180	4,500	day × 25
Subtotal						5,200	
3. **Total**				15,855		5,935	21,790 Baht/day
4. **Output = m3/day**		170 m3/Hr ×	7 Hr	×	1	Units =	1,190 m3/day
Rate = Baht/m3			13	Baht/m3	5	Baht/m3 =	**18**

C-26. Fill & Backfill at Damsite

Rate = 67 Baht/m3 F.C. = 54 Baht/m3

L.C. = 13 Baht/m3

Items	Unit	Quantity	Foreign Currency Rate	Foreign Currency Cost	Local Currency Rate	Local Currency Cost	Remark
1. **Operation Cost (Equipment & Fuel)**							
(1) **Material Transportation**							
Wheel Loader 2.0 m3	1	7.0 Hr	1,145	8,015	55	385	7 Hr × 1
Bulldozer 15 t	1	7.0 Hr	1,370	9,590	70	490	7 Hr × 1
Dump Truck 11t	3	21.0 Hr	580	12,180	50	1,050	7 Hr × 3
(2) **Material Compaction**							
Bulldozer 21 t	1	7.0 Hr	2,265	15,855	105	735	7 Hr × 1
Subtotal				45,640		2,660	
2. **Labor**							
(1) **Material Transportation**							
Foreman		1.0 day			350	350	
Operator of Heavy		2.0 day			350	700	day × 2
Driver		3.0 day			270	810	day × 3
Common Labor		10.0 day			180	1,800	day × 10
(2) **Material Compaction**							
Foreman		1.0 day			350	350	
Operator of Heavy		1.0 day			350	350	day × 1
Common Labor		20.0 day			180	3,600	day × 20
Subtotal						7,960	
3. **Total**				45,640		10,620	56,260 Baht/day
4. **Output = m3/day**		120 m3/Hr ×		7 Hr	×	1	Units = 840 m3/day
Rate = Baht/m3				54	Baht/m3	13	Baht/m3 = 67

C-27 Cost of Gate & Valve

(1/2)

Item	Scale	Unit	Unit Weight (ton)		Total Weight (ton)	Basic Rate F.C. (Baht/ton)	Basic Rate L.C. (Baht/ton)	Unit Cost F.C. (1,000Baht)	Unit Cost L.C. (1,000Baht)	Total Cost (1,000Baht)
1	**Kok Intake Water Head = 2.5 m**									
(1)	**Gate Fixed Roller Gate 3-sides Rubber seal at Upstream**									
a	w = 5 m × H= 2.5 m	2	0.6 t/m2	8	16					
b	w = 10 m × H= 2.5 m	7	0.6 t/m2	15	105					
c	w = 12 m × H= 2.5 m	1	0.6 t/m2	18	18	60%	40%			
			Subtotal		**139**	90,000	60,000	**12,510**	**8,340**	**20,850**
(2)	**Trashrack (Screen)**									
a	w = 5 m × H= 8 m	2	0.3 t/m2	12	24					
b	w = 10 m × H= 8 m	7	0.3 t/m2	24	168					
c	w = 12 m × H= 8 m	1	0.3 t/m2	29	29	60%	40%			
			Subtotal		**221**	18,000	12,000	**3,978**	**2,652**	**6,630**
(3)	**Stoplog (Steel)**									
	w = 5 m × H= 2.5 m	2	0.4 t/m2	5	10					
	w = 10 m × H= 2.5 m	7	0.4 t/m2	10	70					
	w = 12 m × H= 2.5 m	1	0.4 t/m2	12	12	60%	40%			
			Subtotal		**92**	60,000	40,000	**5,520**	**3,680**	**9,200**
			Total Weight (ton)		**452**	**Subtotal**		**22,008**	**14,672**	**36,680**
2	**Ing Intake Water Head = 2.5 m**									
(1)	**Gate Fixed Roller Gate 3-sides Rubber seal at Upstream**									
a	w = 5 m × H= 2.5 m	2	0.6 t/m2	8	16					
b	w = 10 m × H= 2.5 m	9	0.6 t/m2	15	135					
c	w = 12 m × H= 2.5 m	1	0.6 t/m2	18	18	60%	40%			
			Subtotal		**169**	90,000	60,000	**15,210**	**10,140**	**25,350**
(2)	**Trashrack (Screen)**									
	w = 5 m × H= 11.1 m	2	0.35 t/m2	20	40					
	w = 10 m × H= 11.1 m	9	0.35 t/m2	39	351					
	w = 12 m × H= 11.1 m	1	0.35 t/m2	47	47	60%	40%			
			Subtotal		**438**	18,000	12,000	**7,884**	**5,256**	**13,140**
(3)	**Stoplog (Steel)**									
	w = 5 m × H= 2.5 m	2	0.4 t/m2	5	10					
	w = 10 m × H= 2.5 m	9	0.4 t/m2	10	90					
	w = 12 m × H= 2.5 m	1	0.4 t/m2	12	12	60%	40%			
			Subtotal		**112**	60,000	40,000	**6,720**	**4,480**	**11,200**
			Total Weight (ton)		**719**	**Subtotal**		**29,814**	**19,876**	**49,690**
3	**Ing Diversion Weir Water Head = 3.5 m**									
(1)	**Gate Fixed Roller Gate 3-sides Rubber seal at Upstream**					60%	40%			
a	w = 5 m × H= 3.5 m	1	0.6 t/m2	11	**11**	90,000	60,000	**990**	**660**	**1,650**
(2)	**Rubber Gate**					91%	9%			
a	w = 32 m × H= 3.3 m	2			**L.S.**	21,000,000	2,000,000	**42,000**	**4,000**	**46,000**
(3)	**Stoplog (Steel)**					60%	40%			
a	w = 5 m × H= 3.5 m	1	0.45 t/m2	8	**8**	60,000	40,000	**480**	**320**	**800**
			Total Weight (ton)		**19**	**Subtotal**		**43,470**	**4,980**	**48,450**

C-27 Cost of Gate & Valve

(2/2)

Item	Scale	Unit	Unit Weight (ton)		Total Weight (ton)	Basic Rate F.C. (Baht/ton)	Basic Rate L.C. (Baht/ton)	Unit Cost F.C. (1,000Baht)	Unit Cost L.C. (1,000Baht)	Total Cost (1,000Baht)
4	Yao Flood Control Dam									
(1)	Diversion Inlet Gat Water Head = 24 m		4-sides Rubber seal at Upstrean			60%	40%			
a	w = 6.5 m × H= 7 m	1	0.5 t/m2	23	23	60,000	40,000	1,380	920	2,300
(2)	Diversion Intake Water Head = 22.0 m									
a	Intake Gate Fixed Roller Gate		4-sides Rubber seal at Upstrean			60%	40%			
	w = 6.5 m × H= 6.5 m	1	0.7 t/m2	30	30	90,000	60,000	2,700	1,800	4,500
b	Trashrack (Screen) for Intake					60%	40%			
	w = 8.5 m × H= 25 m	1	0.35 t/m2	75	75	18,000	12,000	1,350	900	2,250
c	Stoplog (Steel)					60%	40%			
	w = 6.5 m × H= 6.5 m	1	0.5 t/m2	22	22	60,000	40,000	1,320	880	2,200
(3)	Diversion Outlet Water Head = 22.0 m									
a	Outlet Gate Fixed Roller Gate		4-sides Rubber seal at Upstrean			60%	40%			
	w = 6.5 m × H= 6.5 m	1	0.7 t/m2	30	30	90,000	60,000	2,700	1,800	4,500
b	Stoplog (Steel)					60%	40%			
	w = 6.5 m × H= 6.5 m	1	0.5 t/m2	22	22	60,000	40,000	1,320	880	2,200
(4)	Valve Water Head = 22.0 m									
a	Hollow Jet Valve	1	Diameter	2,000	mm	100% 3,150	0% 0	6,300	0	6,300
b	Guard Valve (Hight Pressure Slide Gate)	1	Diameter	1,000	mm	100% 2,800	0% 0	2,800	0	2,800
(5)	Steel Protection of Tunnel & Conduit Steel Pipe									
a	Steel Liner (12mm) for Tunnel		L = 250	m		60%	40%			
	Diameter		6.5 m		600	36,000	27,000	21,600	16,200	37,800
b	Conduit Steel Pipe (10 mm) for Valve		L = 30	m		60%	40%			
	Diameter		1.0 m		10	36,000	27,000	360	270	630
			Total Weight (ton)		812	Subtotal		41,830	23,650	65,480
5	Total Cost of Gate & Valve							137,122	63,178	200,300

C-28 Kok-Ing-Nan Monitoring & Control System Equipment Cost

(Foreign Currency : Unit 1,000 Baht)

Item	Quantity	Unit Rate	Total
I Kok Intake Station			
1 Equipment			
(1) Control System	1	L.S.	24,000
(2) Monitoring Station	1	L.S.	2,000
(3) Gauging Station	8	600	4,800
(4) Repeater Station for Telemetering	1	L.S.	500
Sub Total			**31,300**
2 Installation Materials	1	L.S.	**8,000**
3 Service			
(1) Installation, Site Survey, Preparation	1	L.S.	**6,000**
4 **Sub Total (1+2+3)**			**45,300**
II Ing-Intake & IWMC			
1 Equipment			
(1) Control System	1	L.S.	32,000
(2) Monitoring Station	1	L.S.	3,000
(3) Gauging Station	8	600	4,800
(4) Repeater Station for Telemetering	1	L.S.	700
(5) Optical Communication System	1	L.S.	7,500
Sub Total			**48,000**
2 Installation Materials	1	L.S.	**10,000**
3 Service			
(1) Installation, Site Survey, Preparation	1	L.S.	**8,500**
4 **Sub Total (1+2+3)**			**66,500**
III Yao Flood Control Dam			
1 Equipment			
(1) Control System	1	L.S.	27,000
(2) Monitoring Station	1	L.S.	2,500
(3) Gauging Station	6	600	3,600
(4) Repeater Station for Telemetering	1	L.S.	700
(5) Warning Supervisory	1	L.S.	3,100
(6) Optical Communication System	1	L.S.	7,000
Sub Total			**43,900**
2 Installation Materials	1	L.S.	**14,000**
3 Service			
(1) Installation, Site Survey, Preparation	1	L.S.	**7,500**
4 **Sub Total (1+2+3)**			**65,400**
			177,200
IV Total (I + II + III)	**×1,000 Baht**	=	**178,000**