Table O 10 BREAKDOWN OF COMPENSATION COST

Bamseonggol (upstream) site

Item	Unit	Unit Cost (₩ 10^3)	El. 260 m Quantity	El. 260 m Amount	El. 265 m Quantity	El. 265 m Amount	El. 270 m Quantity	El. 270 m Amount
Land								
Paddy Field	ha	6,833	110	751,630	137	936,121	142.5	973,703
Upland	ha	5,738	130	745,940	148	849,224	196	1,124,648
Housing Lot	ha	8,409	11	92,499	11	92,499	11.5	96,703
Forest Land	ha	484	128	61,952	151	73,084	178	86,152
Others	ha		111		141		157	
Sub-Total (₩ 10^3)			490	1,652,021	588	1,950,928	685	2,281,206
($)				3,406		4,023		4,703
Ground Facilities and Others								
House	Nos.	600	460	276,000	470	282,000	490	294,000
Appurtenant	Nos.	150	180	27,000	200	30,000	210	31,500
Perennial Crop	Nos.	10	550	5,500	700	7,000	900	9,000
Grave	Nos.	30	80	2,400	80	2,400	80	2,400
Business Right	Nos.	500	50	25,000	50	25,000	50	25,000
Public Facilities	Pyong	200	1,440	288,000	1,500	300,000	1,500	300,000
Transportation Cost for Resettlement	Household	150	460	69,000	470	70,500	490	73,500
Solatium for Resettlement	Person	20	3,220	64,400	3,240	64,800	3,270	65,400
Communication Facilities	km	1,500	7	10,500	7	10,500	9	13,500
Power Distribution Facilities	km	2,000	9	18,000	9	18,000	9	18,000
National Road	km							
Local Road	km	90,000	10	900,000	10	900,000	10	900,000
Express Highway	km							
Sub-Total (₩ 10^3)				1,685,800		1,710,200		1,732,300
($)				3,476		3,526		3,572
Total (₩ 10^3)				3,337,821		3,661,128		4,013,506
US $ Equivalent ($ 10^3)				6,882		7,549		8,275

Table 0 10 Continued (2)

Bamseonggol (upstream) site

Item	Unit	Unit Cost (₩ 10^3)	El. 275 m Quantity	El. 275 m Amount	El. 280 m Quantity	El. 280 m Amount	El. 285 m Quantity	El. 285 m Amount
Land								
Paddy Field	ha	6,833	174	1,188,942	204	1,393,932	219	1,496,427
Upland	ha	5,738	208	1,193,504	231	1,325,478	245	1,405,810
Housing Lot	ha	8,409	12	100,908	13	109,317	27	227,043
Forest Land	ha	484	208	100,672	220	106,480	260	125,840
Others	ha		179		199		212	
Sub-Total (₩ 10^3)			781	2,584,026	867	2,935,207	963	3,255,120
($)				5,328		6,052		6,711
Ground Facilities and Others								
House	Nos.	600	500	300,000	510	306,000	520	312,000
Appurtenant	Nos.	150	215	32,250	220	33,000	225	33,750
Perennial Crop	Nos.	10	2,500	25,000	5,000	50,000	6,000	60,000
Grave	Nos.	30	80	2,400	100	3,000	100	3,000
Business Right	Nos.	500	50	25,000	50	25,000	55	27,500
Public Facilities	Pyong	200	1,500	300,000	1,500	300,000	1,500	300,000
Transportation Cost for Resettlement	Household	150	500	75,000	510	76,500	520	78,000
Solatium for Resettlement	Person	20	3,300	66,000	3,330	66,600	3,400	68,000
Communication Facilities	km	1,500	9	13,500	11	16,500	11	16,500
Power Distribution Facilities	km	2,000	9	18,000	11	22,000	11	22,000
National Road	km							
Local Road	km	90,000	10	900,000	11	990,000	11	990,000
Express Highway	km							
Sub-Total (₩ 10^3)				1,757,150		1,888,600		1,910,750
($)				3,623		3,894		3,940
Total (₩ 10^3)				4,341,176		4,823,807		5,165,870
US $ Equivalent ($ 10^3)				8,951		9,946		10,651

Table 0 10 Continued (3)

Bamseonggol (upstream) site

Item	Unit	Unit Cost (₩ 10³)	El. 290 m Quantity	El. 290 m Amount	El. 295 m Quantity	El. 295 m Amount	El. 300 m Quantity	El. 300 m Amount
Land								
Paddy Field	ha	6,833	229	1,564,757	263	1,797,079	282	1,926,906
Upland	ha	5,738	265	1,520,570	310	1,778,780	342	1,962,396
Housing Lot	ha	8,409	28	235,452	28	235,452	28	235,452
Forest Land	ha	484	312	151,008	319	154,396	330	159,720
Others	ha		230		246		276	
Sub-Total (₩ 10³)			1,064	3,471,787	1,166	3,965,707	1,258	4,284,474
($)				7,158		8,177		8,834
Ground Facilities and Others								
House	Nos.	600	525	315,000	535	321,000	546	327,600
Appurtenant	Nos.	150	230	34,500	232	34,800	235	35,250
Perennial Crop	Nos.	10	7,500	75,000	7,500	75,000	7,500	75,000
Grave	Nos.	30	100	3,000	100	3,000	100	3,000
Business Right	Nos.	500	55	27,500	56	28,000	60	30,000
Public Facilities	Pyong	200	1,550	310,000	1,550	310,000	1,550	310,000
Transportation Cost for Resettlement	Household	150	525	78,750	535	80,250	540	81,000
Solatium for Resettlement	Person	20	3,410	68,200	3,420	68,400	3,500	70,000
Communication Facilities	km	1,500	11	16,500	12	18,000	12	18,000
Power Distribution Facilities	km	2,000	11	22,000	12	24,000	12	24,000
National Road	km							
Local Road	km	90,000	11	990,000	12	1,080,000	14	1,260,000
Express Highway	km							
Sub-Total (₩ 10³)				1,940,450		2,042,450		2,233,850
($)				4,001		4,211		4,606
Total (₩ 10³)				5,412,237		6,008,157		6,518,324
US $ Equivalent ($ 10³)				11,159		12,388		13,440

Table 0 10 Continued (4)

Bamseonggol (upstream) site

Item	Unit	Unit Cost (₩ 10^3)	El. 305 m Quantity	El. 305 m Amount	El. 310 m Quantity	El. 310 m Amount
Land						
Paddy Field	ha	6,833	290	1,981,570	310	2,118,230
Upland	ha	5,738	386	2,214,868	393	2,255,034
Housing Lot	ha	8,409	28	235,452	29	243,861
Forest Land	ha	484	353	170,852	453	219,252
Others	ha		291		334	
Sub-Total (₩ 10^3)			1,348	4,602,742	1,519	4,836,377
($)				9,490		9,972
Ground Facilities and Others						
House	Nos.	600	548	328,800	550	330,000
Appurtenant	Nos.	150	235	35,250	240	36,000
Perennial Crop	Nos.	10	8,000	80,000	9,000	90,000
Grave	Nos.	30	100	3,000	100	3,000
Business Right	Nos.	500	60	30,000	60	30,000
Public Facilities	Pyong	200	1,550	310,000	1,550	310,000
Transportation Cost for Resettlement	Household	150	548	82,200	550	82,500
Solatium for Resettlement	Person	20	3,520	70,400	3,550	71,000
Communication Facilities	km	1,500	13	19,500	13	19,500
Power Distribution Facilities	km	2,000	13	26,000	13	26,000
National Road	km					
Local Road	km	90,000	14	1,260,000	14	1,260,000
Sub-Total (₩ 10^3)				2,245,150		2,258,000
($)				4,629		4,656
Total (₩ 10^3)				6,847,892		7,094,377
US $ Equivalent ($ 10^3)				14,119		14,628

Table 0 10 Continued (5)

Bamseonggol (downstream) site

Item	Unit	Unit Cost (₩ 10^3)	El. 240 m Quantity	El. 240 m Amount	El. 245 m Quantity	El. 245 m Amount	El. 250 m Quantity	El. 250 m Amount
Land								
Paddy Field	ha	6,833	85	580,805	95	649,135	134	915,622
Upland	ha	5,738	60	344,280	110	631,180	120	688,560
Housing Lot	ha	8,409	8	67,272	8	67,272	9	75,681
Forest Land	ha	484	39	18,876	56	27,104	90	43,560
Others	ha		64		101		117	
Sub-Total (₩ 10^3)			256	1,011,233	370	1,374,691	470	1,723,423
($)				2,085		2,834		3,553
Ground Facilities and Others								
House	Nos.	600	410	246,000	420	252,000	443	265,800
Appurtenant	Nos.	150	150	22,500	180	27,000	210	31,500
Perennial Crop	Nos.	10	300	3,000	450	4,500	500	5,000
Grave	Nos.	30	60	1,800	70	2,100	80	2,400
Business Right	Nos.	500	35	17,500	40	20,000	50	25,000
Public Facilities	Pyong	200	1,440	288,000	1,440	288,000	1,440	288,000
Transportation Cost for Resettlement	Household	150	410	61,500	420	63,000	443	66,450
Solatium for Resettlement	Person	20	2,870	57,400	2,940	58,800	3,025	60,500
Communication Facilities	km	1,500	7	10,500	7	10,500	7	10,500
Power Distribution Facilities	km	2,000	9	18,000	9	18,000	9	18,000
National Road	km							
Local Road	km	90,000	7	630,000	7	630,000	8	720,000
Sub-Total (₩ 10^3)				1,356,200		1,373,900		1,493,150
($)				2,796		2,833		3,079
Total (₩ 10^3)				2,367,433		2,748,591		3,216,573
US $ Equivalent ($ 10^3)				4,881		5,667		6,632

Table 0 10 Continued (6)

Bamseonggol (downstream) site

Item	Unit	Unit Cost (₩ 10^3)	El. 255 m Quantity	El. 255 m Amount	El. 260 m Quantity	El. 260 m Amount	El. 265 m Quantity	El. 265 m Amount
Land								
Paddy Field	ha	6,833	144	983,952	152	1,038,616	157	1,072,781
Upland	ha	5,738	125	717,250	134	368,892	168	963,984
Housing Lot	ha	8,409	10	84,090	11	92,499	12	100,908
Forest Land	ha	484	108	52,272	143	69,212	171	82,764
Others	ha		129		140		162	
Sub-Total (₩ 10^3)			516	1,837,564	580	1,969,219	670	2,220,437
($)				3,789		4,060		4,578
Ground Facilities and Others								
House	Nos.	600	457	274,200	475	285,000	480	288,000
Appurtenant	Nos.	150	250	37,500	250	37,500	250	37,500
Perennial Crop	Nos.	10	550	5,500	610	6,100	700	7,000
Grave	Nos.	30	80	2,400	80	2,400	80	2,400
Business Right	Nos.	500	50	25,000	50	25,000	50	25,000
Public Facilities	Pyong	200	1,440	288,000	1,500	300,000	1,500	300,000
Transportation Cost for Resettlement	Household	150	457	68,550	475	71,250	480	72,000
Solatium for Resettlement	Person	20	3,171	63,420	3,230	64,600	3,250	65,000
Communication Facilities	km	1,500	7	10,500	7	10,500	7	10,500
Power Distribution Facilities	km	2,000	9	18,000	9	18,000	9	18,000
National Road	km							
Local Road	km	90,000	9	810,000	10	900,000	10	900,000
Express Highway	km							
Sub-Total (₩ 10^3)				1,603,070		1,720,350		1,725,400
($)				3,305		3,547		3,558
Total (₩ 10^3)				3,440,634		3,689,569		3,945,837
US $ Equivalent ($ 10^3)				7,094		7,607		8,136

Table 0 10 Continued (7)

Bamseonggol (downstream) site

Item	Unit	Unit Cost (₩ 10^3)	El. 270 m Quantity	El. 270 m Amount	El. 275 m Quantity	El. 275 m Amount	El. 280 m Quantity	El. 280 m Amount
Land								
Paddy Field	ha	6,833	162	1,106,946	184	1,257,272	224	1,530,592
Upland	ha	5,738	216	1,239,408	228	1,308,264	251	1,440,238
Housing Lot	ha	8,409	13	109,317	13	109,317	14	117,726
Forest Land	ha	484	193	93,412	213	103,092	233	112,772
Others	ha		191		225		257	
Sub-Total (₩ 10^3)			775	2,549,083	863	2,777,945	979	3,201,328
($)				5,256		5,728		6,601
Ground Facilities and Others								
House	Nos.	600	500	300,000	510	306,000	520	312,000
Appurtenant	Nos.	150	250	36,500	260	39,000	270	40,500
Perennial Crop	Nos.	10	900	9,000	2,600	26,000	5,000	50,000
Grave	Nos.	30	80	2,400	80	2,400	100	3,000
Business Right	Nos.	500	50	25,000	50	25,000	50	25,000
Public Facilities	Pyong	200	1,500	300,000	1,500	300,000	1,500	300,000
Transportation Cost for Resettlement	Household	150	500	75,000	510	76,500	520	78,000
Solatium for Resettlement	Person	20	3,280	65,600	3,350	67,000	3,360	67,200
Communication Facilities	km	1,500	9	13,500	9	13,500	11	16,500
Power Distribution Facilities	km	2,000	9	18,000	9	18,000	11	22,000
National Road	km							
Local Road	km	90,000	10	900,000	10	900,000	11	990,000
Express Highway	km							
Sub-Total (₩ 10^3)				1,746,000		1,773,400		1,904,200
($)				3,600		3,656		3,926
Total (₩ 10^3)				4,295,083		4,551,345		5,105,528
US $ Equivalent ($ 10^3)				8,856		9,384		10,527

Table 0 10 Continued (8)

Bamseonggol (downstream) site

Item	Unit	Unit Cost (₩ 10^3)	El. 285 m Quantity	El. 285 m Amount	El. 290 m Quantity	El. 290 m Amount	El. 295 m Quantity	El. 295 m Amount
Land								
Paddy Field	ha	6,833	239	1,633,087	249	1,701,417	283	1,933,739
Upland	ha	5,738	265	1,520,570	285	1,635,330	320	1,836,160
Housing Lot	ha	8,409	27	227,043	28	235,452	28	235,452
Forest Land	ha	484	265	128,260	323	156,332	335	162,140
Others	ha		259		271		292	
Sub-Total (₩ 10^3)			1,055	3,508,960	1,156	3,728,531	1,258	4,167,491
($)				7,235		7,688		8,593
Ground Facilities and Others								
House	Nos.	600	530	318,000	502	318,000	530	318,000
Appurtenant	Nos.	150	275	41,250	280	42,000	290	43,500
Perennial Crop	Nos.	10	6,000	60,000	7,500	75,000	7,500	75,000
Grave	Nos.	30	100	3,000	100	3,000	100	3,000
Business Right	Nos.	500	55	27,500	55	27,500	56	28,000
Public Facilities	Pyong	200	1,500	300,000	1,550	310,000	1,550	310,000
Transportation Cost for Resettlement	Household	150	530	79,500	530	79,500	530	79,500
Solatium for Resettlement	Person	20	3,380	67,600	3,410	68,200	3,420	68,400
Communication Facilities	km	1,500	11	16,500	11	16,500	12	18,000
Power Distribution Facilities	km	2,000	11	22,000	11	22,000	12	24,000
National Road	km							
Local Road	km	90,000	11	990,000	11	990,000	12	1,080,000
Express Highway	km							
Sub-Total (₩ 10^3)				1,925,350		1,591,700		2,047,400
($)				3,970		4,024		4,221
Total (₩ 10^3)				5,434,310		5,680,231		6,214,891
US $ Equivalent ($ 10^3)				11,205		11,712		12,814

Table 0 10 Continued (9)

Bamseonggol (downstream) site

Item	Unit	Unit Cost (₩ 10^3)	El. 300 m Quantity	El. 300 m Amount	El. 305 m Quantity	El. 305 m Amount	El. 310 m Quantity	El. 310 m Amount
Land								
Paddy Field	ha	6,833	292	1,995,236	295	2,015,735	315	2,152,395
Upand	ha	5,738	362	2,077,156	382	2,191,916	397	2,277,986
Housing Lot	ha	8,409	29	243,861	29	243,861	29	243,861
Forest Land	ha	484	350	169,400	384	185,856	489	236,676
Others	ha		323		345		380	
Sub-Total (₩ 10^3)			1,356	4,485,653	1,4535	4,637,368	1,610	4,910,918
($)				9,249		9,561		10,125
Ground Facilities and Others								
House	Nos.	600	560	336,000	560	336,000	560	336,000
Appurtenant	Nos.	150	290	43,500	290	43,500	290	43,500
Perennial Corp	Nos.	10	7,500	75,000	8,000	80,000	9,000	90,000
Grave	Nos.	30	100	3,000	100	3,000	100	3,000
Business Right	Nos.	500	60	30,000	60	30,000	60	30,000
Public Facilities	Pyong	200	1,550	310,000	1,550	310,000	1,550	310,000
Transportation Cost for Resettlement	Household	150	560	84,000	560	84,000	560	84,000
Solatium for Resettlement	Person	20	3,460	69,200	3,570	71,400	3,580	71,600
Communication Facilities	km	1,500	12	18,000	13	19,500	13	19,500
Power Distribution Facilities	km	2,000	12	24,000	13	26,000	13	26,000
National Road	km							
Local Road	km	90,000	14	1,260,000	14	1,260,000	14	1,260,000
Express Highway	km							
Sub-Total (₩ 10^3)				2,252,700		2,263,400		2,273,600
($)				4,645		4,667		4,688
Total (₩ 10^3)				6,738,353		6,900,768		7,184,518
US $ Equivalent ($ 10^3)				13,894		14,228		14,813

Table 0 10 Continued (10)

Inje (upstream) site

Item	Unit	Unit Cost (₩ 10^3)	El. 325 m Quantity	El. 325 m Amount	El. 330 m Quantity	El. 330 m Amount	El. 335 m Quantity	El. 335 m Amount
Land								
Paddy Field	ha	9,352	153	1,430,856	161	1,505,672	169	1,580,488
Upland	ha	7,719	378	2,917,782	455	3.512,145	483	3,728,277
Housing Lot	ha	8,404	6	50,424	8	67,232	9	75,636
Forest Land	ha	514	1,098	564,372	1,280	657,920	1,750	899,500
Others	ha		615		625		629	
Sub-Total (₩ 10^3)			2,250	4,963,434	2,529	5,742,969	3,040	6,283,901
($)				10,234		11,841		12,956
Ground Facilities and Others								
House	Nos.	600	1,300	780,000	1,330	798,000	1,361	816,600
Appurtenant	Nos.	150	570	85,500	600	90,000	610	91,500
Perennial Crop	Nos.	10	23,000	230,000	23,000	230,000	24,850	248,500
Grave	Nos.	30	410	12,300	420	12,600	465	13,950
Business Right	Nos.	500	180	90,000	190	95,000	196	98,000
Public Facilities	Pyong	200	1,600	320,000	1,600	320,000	1,658	331,600
Transportation Cost for Resettlement	Household	150	1,300	195,000	1,330	199,500	1,361	204,150
Solatium for Resettlement	Person	20	5,850	117,000	5,985	119,700	6,124	122,480
Communication Facilities	km	1,500	11	16,500	11	16,500	12	18,000
Power Distribution Facilities	km	2,000	11	22,000	11	22,000	12	24,000
National Road	km							
Local Road	km	90,000	36	3,240,000	39	3,510,000	41	3,690,000
Express Highway	km							
Sub-Total (₩ 10^3)				5,108,300		5,413,300		5,658,780
($)				10,532		11,162		11,668
Total (₩ 10^3)				10,071,734		11,156,269		11,942,681
US $ Equivalent ($ 10^3)				20,766		23,003		24,624

Table 0 10 Continued (11)

Inje (upstream) site

Item	Unit	Unit Cost (₩ 10^3)	El. 340 m Quantity	El. 340 m Amount	El. 345 m Quantity	El. 345 m Amount	El. 350 m Quantity	El. 350 m Amount
Land								
Paddy Field	ha	9,352	172	1,608,544	187	1,748,824	198	1,851,696
Upland	ha	7,719	490	3,782,310	530	4,091,070	620	4,785,780
Housing Lot	ha	8,404	15	126,060	19	159,676	20	168,080
Forest Land	ha	514	1,920	986,880	2,054	1,055,756	2,193	1,127,202
Others	ha		643		660		720	
Sub-Total (₩ 10^3)			3,240	6,503,794	3,450	7,055,326	3,751	7,932,758
($)				13,410		14,547		16,356
Ground Facilities and Others								
House	Nos.	600	1,366	819,600	1,390	834,000	1,400	840,000
Appurtenant	Nos.	150	620	93,000	670	100,500	680	102,000
Perennial Crop	Nos.	10	25,500	255,000	27,500	275,000	29,000	290,000
Grave	Nos.	30	480	14,400	500	15,000	500	15,000
Business Right	Nos.	500	200	100,000	220	110,000	220	110,000
Public Facilities	Pyong	200	1,700	340,000	1,800	360,000	1,900	380,000
Transportation Cost for Resettlement	Household	150	1,366	204,900	1,390	208,500	1,400	210,000
Solatium for Resettlement	Person	20	6,147	122,940	6,633	132,660	6,670	133,400
Communication Facilities	km	1,500	13	19,500	14	21,000	20	30,000
Power Distribution Facilities	km	2,000	13	26,000	14	28,000	20	40,000
National Road	km							
Local Road	km	90,000	45	4,050,000	50	4,500,000	50	4,500,000
Express Highway	km							
Sub-Total (₩ 10^3)				6,045,340		6,584,660		6,650,400
($)				12,465		13,577		13,712
Total (₩ 10^3)				12,549,134		13,639,986		14,583,158
US $ Equivalent ($ 10^3)				25,875		28,124		30,068

Table 0 10 Continued (12)

Inje (downstream) site

Item	Unit	Unit Cost (₩ 10^3)	El. 325 m Quantity	El. 325 m Amount	El. 330 m Quantity	El. 330 m Amount	El. 335 m Quantity	El. 335 m Amount
Land								
Paddy Field	ha	9,352	170	1,589,840	178	1,664,656	182.8	1,709,545
Upland	ha	7,719	400	3,087,600	500	3,859,500	519	4,006,161
Housing Lot	ha	8,404	7	58,828	10	84,040	11.2	94,124
Forest Land	ha	514	1,220	627,080	1,407	723,198	1,890	971,460
Others	ha		653		655		657	
Sub-Total (₩ 10^3)			2,450	5,363,348	2,750	6,331,394	3,260	6,781,290
($)				11,059		13,055		13,982
Ground Facilities and Others								
House	Nos.	600	1,320	792,000	1,350	810,000	1,381	828,600
Appurtenant	Nos.	150	600	90,000	620	93,000	661	99,150
Perennial Crop	Nos.	10	24,000	240,000	25,000	250,000	26,850	268,500
Grave	Nos.	30	450	13,500	450	13,500	495	14,850
Business Right	Nos.	500	200	100,000	210	105,000	216	108,000
Public Facilities	Pyong	200	1,700	340,000	1,700	340,000	1,758	351,600
Transportation Cost for Resettlement	Household	150	1,320	198,000	1,350	202,500	1,381	207,150
Solatium for Resettlement	Person	20	6,204	124,080	6,345	126,900	6,548	130,960
Communication Facilities	km	1,500	14	21,000	14	21,000	14	21,000
Power Distribution Facilities	km	2,000	14	28,000	14	28,000	14	28,000
National Road	km							
Local Road	km	90,000	40	3,600,000	43	3,870,000	45	4,050,000
Express Highway	km							
Sub-Total (₩ 10^3)				5,546,580		5,859,900		6,107,810
($)				11,436		12,082		12,593
Total (₩ 10^3)				10,909,928		12,191,294		12,889,100
US $ Equivalent ($ 10^3)				22,495		25,137		26,575

Table 0 10 Continued (13)

Inje (downstream) site

Item	Unit	Unit Cost (₩ 10^3)	El. 340 m Quantity	El. 340 m Amount	El. 345 m Quantity	El. 345 m Amount	El. 350 m Quantity	El. 350 m Amount
Land								
Paddy Field	ha	9,352	185	1,730,120	187	1,748,824	200	1,870,400
Upland	ha	7,719	525	4,052,475	530	4,091,070	625	4,824,375
Housing Lot	ha	8,404	16	134,464	19	159,676	20	168,080
Forest Land	ha	514	2,075	1,066,550	2,164	1,112,296	2,195	1,128,230
Others	ha		659		660		770	
Sub-Total (₩ 10^3)			3,460	6,983,609	3,560	7,111,866	3,810	7,991,085
($)				14,399		14,664		16,476
Ground Facilities and Others								
House	Nos.	600	1,386	831,600	1,395	837,000	1,410	846,000
Appurtenant	Nos.	150	670	100,500	675	101,250	695	104,250
Perennial Crop	Nos.	10	27,000	270,000	28,000	280,000	29,000	290,000
Grave	Nos.	30	500	15,000	500	15,000	500	15,000
Business Right	Nos.	500	220	110,000	220	110,000	220	110,000
Public Facilities	Pyong	200	1,800	360,000	1,850	370,000	1,900	380,000
Transportation Cost for Resettlement	Household	150	1,386	207,900	1,395	209,250	1,410	211,500
Solatium for Resettlement	Person	20	6,614	132,280	6,640	132,800	7,050	141,000
Communucation Facilities	km	1,500	14	21,000	14	21,000	20	30,000
Power Distribution Facilities	km	2,000	14	28,000	14	28,000	20	40,000
National Road	km							
Local Road	km	90,000	48	4,320,000	50	4,500,000	50	4,500,000
Express Highway	km							
Sub-Total (₩ 10^3)				6,396,280		6,604,300		6,667,750
($)				13,188		13,617		13,748
Total (₩ 10^3)				13,379,889		13,716,166		14,658,835
US $ Equivalent ($ 10^3)				27,587		28,281		30,224

Table 0 10 Continued (14)

Hongcheon site

Item	Unit	Unit Cost (₩ 10^3)	El. 114.8 m Quantity	El. 114.8 m Amount	El. 119.8 m Quantity	El. 119.8 m Amount	El. 124.8 m Quantity	El. 124.8 m Amount
Land								
Paddy Field	ha	8,212	1,233	10,125,396	1,419	11,652,828	1,455	11,948,460
Upland	ha	6,337	863	5,468,831	984	6,235,608	1,282	8,124,034
Housing Lot	ha	11,541	40	461,640	45	519,345	49	565,509
Forest Land	ha	747	1,062	793,314	1,314	981,558	1,403	1,048,041
Others	ha		902		1,123		1,251	
Sub-Total (₩ 10^3)			4,100	16,849,181	4,885	19,389,339	5,440	21,686,044
($)				34,741		39,978		44,713
Ground Facilities and Others								
House	Nos.	600	1,450	870,000	1,470	882,000	1,483	889,800
Appurtenant	Nos.	150	750	112,500	800	120,000	910	136,500
Perennial Crop	Nos.	10	11,000	110,000	12,000	120,000	12,360	123,600
Grave	Nos.	30	600	18,000	650	19,500	672	20,160
Business Right	Nos.	500	70	35,000	75	37,500	82	41,000
Public Facilities	Pyong	200	3,500	700,000	3,500	700,000	4,110	822,000
Transportation Cost for Resettlement	Household	150	1,450	217,500	1,470	220,500	1,520	228,000
Solatium for Resettlement	Person	20	8,300	166,000	8,500	170,000	8,862	177,240
Communication Facilities	km	1,500	14	21,000	14	21,000	14	21,000
Power Distriburion Facilities	km	2,000	14	28,000	14	28,000	14	28,000
National Road	km							
Local Road	km	90,000	23	2,070,000	24	2,160,000	25	2,250,000
Express Highway	km	300,000						
Sub-Total (₩ 10^3)				4,348,000		4,478,500		4,737,300
($)				8,965		9,234		9,768
Total (₩ 10^3)				21,197,181		23,867,839		26,423,344
US $ Equivalent ($ 10^3)				43,706		49,212		54,481

Table 0 10 Continued (15)

Hongcheon site

Item	Unit	Unit Cost (₩ 10^3)	El. 129.8 m Quantity	El. 129.8 m Amount	El. 134.8 m Quantity	El. 134.8 m Amount
Land						
Paddy Field	ha	8,212	1,541,	12,654,692	1,592	13,073,504
Upland	ha	6,337	1,458	9,239,346	1,541	9,765,317
Housing Lot	ha	11,541	59	680,919	60	692,460
Forest Land	ha	747	1,559	1,164,573	1,820	1,359,540
Others	ha		1,378		1,497	
Sub-Total (₩ 10^3)			5,995	23,739,530	6,510	24,890,821
($)				48,947		51,321
Ground Facilities and Others						
House	Nos.	600	2,093	1,255,800	2,193	1,315,800
Appurtenant	Nos.	150	1,200	180,000	1,300	195,000
Perennial Crop	Nos.	10	12,400	124,000	12,500	125,000
Grave	Nos.	30	680	20,400	680	20,400
Business Right	Nos.	500	262	131,000	273	136,500
Public Facilities	Pyong	200	10,068	2,013,600	10,068	2,013,600
Transportation Cost for Resettlement	Household	150	2,093	313,950	2,193	328,950
Solatium for Resettlement	Person	20	12,108	242,160	12,880	257,600
Communication Facilities	km	1,500	14	21,000	14	21,000
Power Distribution Facilities	km	2,000	14	28,000	14	28,000
National Road	km					
Local Road	km	90,000	26	2,340,000	28	2,520,000
Express Highway	km	300,000			2	600,000
Sub-Total (₩ 10^3)				6,669,910		7,561,850
($)				13,752		15,592
Total (₩ 10^3)				30,409,440		32,452,671
US $ Equivalent ($ 10^3)				62,700		66,913

Table 0 10 Continued (16)

Gujeol site

Item	Unit	Unit Cost (₩ 10^3)	El. 720 m Quantity	El. 720 m Amount	El. 725 m Quantity	El. 725 m Amount	El. 730 m Quantity	El. 730 m Amount
Land								
Paddy Field	ha	9,018	7	63,126	12	108,216	14	126,252
Upland	ha	6,893	38	261,934	59	406,687	92	634,156
Housing Lot	ha	13,564	2	7,128	5	67,820	11	149,204
Forest Land	ha	393	21	8,253	29	11,397	38	14,934
Others	ha		20		38		54	
Sub-Total (₩ 10^3)			88	360,441	143	594,120	209	924,546
($)				743		1,225		1,907
Ground Facilities and Others								
House	Nos.	600	18	10,800	58	34,800	100	60,000
Appurtenant	Nos.	150	3	450	15	2,250	20	3,000
Perennial Crop	Nos.							
Grave	Nos.	30						
Business Right	Nos.	500						
Public Facilities	Pyong	200						
Transportation Cost for Resettlement	Household	150	18	2,700	58	8,700	100	15,000
Solatium for Resettlement	Person	20	198	3,960	638	12,760	1,100	22,000
Communication Facilities	km	1,500					5	7,500
Power Distribution Facilities	km	2,000					5	10,000
National Road	km	130,000						
Local Road	km	90,000						
Express Highway	km	300,000						
Sub-Total (₩ 10^3)				17,910		58,510		117,500
($)				37		121		242
Total (₩ 10^3)				378,351		652,630		1,042,046
US $ Equivalent ($ 10^3)				780		1,346		2,149

Table 0 10 Continued (17)

Gujeol site

Item	Unit	Unit Cost (₩ 10^3)	El. 735 m Quantity	El. 735 m Amount	El. 740 m Quantity	El. 740 m Amount	El. 745 m Quantity	El. 745 m Amount
Land								
Paddy Field	ha	9,018	20	180,360	23	207,414	33	297,594
Upland	ha	6,893	110	758,230	140	965,020	160	1,102,880
Housing Lot	ha	13,564	15	203,460	18	244,152	29	393,356
Forest Land	ha	393	47	18,471	82	32,226	150	58,950
Others	ha		83		112		145	
Sub-Total (₩ 10^3)			275	1,160,521	375	1,448,812	517	1,852,780
($)				2,393		2,987		3,820
Ground Facilities and Others								
House	Nos.	600	232	139,200	364	218,400	413	247,800
Appurtenant	Nos.	150	75	11,250	90	13,500	110	16,500
Perennial Crop	Nos.							
Grave	Nos.	30	50	1,500	50	1,500	50	1,500
Business Right	Nos.	500	40	20,000	114	57,000	114	57,000
Public Facilities	Pyong	200	4,900	980,000	5,109	1,021,800	6,100	1,220,000
Transportation Cost for Resettlement	Household	150	232	34,800	364	54,600	413	61,950
Solatium for Resettlement	Person	20	2,552	51,040	4,007	80,140	4,543	90,860
Communication Facilities	km	1,500	5	7,500	5	7,500	5	7,500
Power Distribution Facilities	km	2,000	5	10,000	5	10,000	5	10,000
National Road	km	130,000	2	260,000	2	260,000	2	260,000
Local Road	km							
Express Highway	km	300,000			0.2	60,000	0.7	210,000
Sub-Total (₩ 10^3)				1,515,290		1,784,440		2,183,110
($)				3,124		3,679		4,501
Total (₩ 10^3)				2,675,811		3,233,252		4,035,890
US $ Equivalent ($ 10^3)				5,517		6,666		8,321

Table 0 10 Continued (18)

Gujeol site

Item	Unit	Unit Cost (₩ 10^3)	El. 750 m Quantity	El. 750 m Amount
Land				
Paddy Field	ha	9,018	47	423,846
Upland	ha	6,893	201	1,385,493
Housing Lot	ha	13,564	35	474,740
Forest Land	ha	393	285	112,005
Others	ha		169	
Sub-Total (₩ 10^3)			737	2,396,084
($)				4,941
Ground Facilities and Others				
House	Nos.	600	464	278,400
Appurtenant	Nos.	150	120	18,000
Perennial Crop	Nos.			
Grave	Nos.	30	50	1,500
Business Right	Nos.	500	114	57,000
Public Facilities	Pyong	200	6,100	1,220,000
Transportation Cost for Resettlement	Household	150	464	69,600
Solatium for Resettlement	Person	20	5,104	102,080
Communication Facilities	km	1,500	5	7,500
Power Distribution Facilities	km	2,000	5	10,000
National Road	km	130,000	2.5	325,000
Local Road	km			
Express Highway	km	300,000	0.7	210,000
Sub-Total (₩ 10^3)				2,299,080
($)				4,740
Total (₩ 10^3)				4,695,164
US $ Equivalent ($ 10^3)				9,681

Table 0 10 Continued (19)

Dalcheon site

Item	Unit	Unit Cost (₩ 10^3)	El. 106.1 m Quantity	El. 106.1 m Amount	El. 111.1 m Quantity	El. 111.1 m Amount	El. 116.1 m Quantity	El. 116.1 m Amount
Land								
Paddy Field	ha	10,735	1,134	12,173,490	1,533	16,456,755	2,062	22,135,570
Upland	ha	8,194	594	4,867,236	839	6,874,766	1,067	8,742,998
Housing Lot	ha	6,157	108	664,956	110	677,270	120	738,840
Forest Land	ha	879	324	284,796	438	385,002	631	554,649
Others	ha		540		730		970	
Sub-Total (₩ 10^3)			2,700	17,990,470	3,650	24,393,793	4,850	32,172,057
($)				37,094		50,296		66,334
Ground Facilities and Others								
House	Nos.	600	1,400	840,000	1,400	840,000	1,434	860,400
Appurtenant	Nos.	150	900	135,000	900	135,000	952	142,800
Perennial Crop	Nos.	10	15,000	150,000	15,500	155,000	20,930	209,300
Grave	Nos.	30	150	4,500	200	6,000	231	6,930
Business Right	Nos.	500	20	10,000	40	20,000	51	25,500
Public Facilities	Pyong	200	2,000	400,000	3,000	600,000	3,435	687,000
Transportation Cost for Resettlement	Household	150	1,400	210,000	1,400	210,000	1,434	215,100
Solatium for Resettlement	Person	20	7,840	156,800	7,840	156,800	8,026	160,520
Communication Facilities	km	1,500	13.2	19,800	13.2	19,800	13.2	19,800
Power Distribution Facilities	km	2,000	21	42,000	21	42,000	21	42,000
National Road	km							
Local Road	km	90,000	10	900,000	11	990,000	12	1,080,000
Express Highway	km							
Sub-Total (₩ 10^3)				2,868,100		3,174,600		3,449,350
($)				5,913		6,546		7,112
Total (₩ 10^3)				20,858,578		27,568,393		35,621,407
US $ Equivalent ($ 10^3)				43,007		56,842		73,446

Table 0 10 Continued (20)

Dalcheon site

Item	Unit	Unit Cost (₩ 10^3)	El. 121.1 m Quantity	El. 121.1 m Amount	El. 126.1 m Quantity	El. 126.1 m Amount
Land						
Paddy Field	ha	10,735	2,359	25,323,865	2,490	26,730,150
Upland	ha	8,194	1,444	11,832,136	1,845	15,117,930
Housing Lot	ha	6,157	130	800,410	134	825,038
Forest Land	ha	879	907	797,253	1,076	945,804
Others	ha		1,210		1,370	
Sub-Total (₩ 10^3)			6,050	38,753,664	6,915	43,618,922
($)				79,905		89,936
Ground Facilities and Others						
House	Nos.	600	1,470	882,000	1,470	882,000
Appurtenant	Nos.	150	1,005	150,750	1,005	150,750
Perennial Crop	Nos.	10	21,500	215,000	21,500	215,000
Grave	Nos.	30	238	7,140	238	7,140
Business Right	Nos.	500	56	28,000	56	28,000
Public Facilities	Pyong	200	3,500	700,000	3,500	700,000
Transportation Cost for Resettlement	Household	150	1,470	220,500	1,470	220,500
Solatium for Resettlement	Person	20	8,238	164,760	8,238	164,760
Communication Facilities	km	1,500	13.2	19,800	13.2	19,800
Power Distribution Facilities	km	2,000	21	42,000	21	42,000
National Road	km					
Local Road	km	90,000	14	1,260,000	14	1,260,000
Express Highway	km					
Sub-Total (₩ 10^3)				3,689,950		3,689,950
($)				7,608		7,608
Total (₩ 10^3)				42,443,614		47,308,872
US $ Equivalent ($ 10^3)				87,513		97,544

Table 0 10 Continued (21)

Ganhyeon site

Item	Unit	Unit Cost (₩ 10^3)	El. 70 m Quantity	El. 70 m Amount	El. 75 m Quantity	El. 75 m Amount	El. 80 m Quantity	El. 80 m Amount
Land								
Paddy Field	ha	10,666	41	437,306	105	1,119,930	195	2,079,870
Upland	ha	9,508	39	370,812	74	703,592	126	1,198,008
Housing Lot	ha	11,483			2	22,966	3	34,449
Forest Land	ha	791	99	78,309	110	87,010	130	102,830
Others	ha		63		94		129	
Sub-Total (₩ 10^3)			242	886,427	385	1,933,498	583	3,415,157
($)				1,828		3,987		7,041
Ground Facilities and Others								
House	Nos.	600			55	33,000	80	48,000
Appurtenant	Nos.	150			11	1,650	11	1,650
Perennial Crop	Nos.	10			1,000	10,000	2,000	20,000
Grave	Nos.	30						
Business Right	Nos.	500						
Public Facilities	Pyong	200						
Transportation Cost for Resettlement	Household	150			55	8,250	80	12,000
Solatium for Resettlement	Person	20			269	5,380	396	7,920
Communication Facilities	km	1,500						
Power Distribution Facilities	km	2,000						
National Road	km							
Local Road	km	90,000					2	180,000
Express Highway	km							
Sub-Total (₩ 10^3)						58,280		269,570
($)								556
Total (₩ 10^3)				886,427		1,991,778		3,684,727
US $ Equivalent ($ 10^3)				1,828		4,107		7,597

Table 0 10 Continued (22)

Ganhyeon site

Item	Unit	Unit Cost (₩ 10^3)	El. 85 m Quantity	El. 85 m Amount	El. 90 m Quantity	El. 90 m Amount	El. 95 m Quantity	El. 95 m Amount
Land								
Paddy Field	ha	10,666	349	3,722,434	454	4,842,364	655	6,986,230
Upland	ha	9,508	236	2,243,888	293	2,785,844	385	3,660,580
Housing Lot	ha	11,483	4	45,932	7	80,381	25	287,075
Forest Land	ha	791	150	118,650	390	308,490	519	410,529
Others	ha		218		341		475	
Sub-Total (₩ 10^3)			957	6,130,904	1,485	8,017,079	2,059	11,344,414
($)				12,641		16,530		23,391
Ground Facilities and Others								
House	Nos.	600	144	86,400	252	151,200	418	250,800
Appurtenant	Nos.	150	28	4,200	50	7,500	83	12,450
Perennial Crop	Nos.	10	5,000	50,000	10,000	100,000	20,000	200,000
Grave	Nos.	30			200	6,000	300	9,000
Business Right	Nos.	500	5	2,500	15	7,500	15	7,500
Public Facilities	Pyong	200			400	80,000	1,000	200,000
Transportation Cost for Resettlement	Household	150	144	21,600	252	37,800	418	62,700
Solatium for Resettlement	Person	20	706	14,120	1,235	24,700	2,048	40,960
Communication Facilities	km	1,500			10	15,000	10	15,000
Power Distribution Facilities	km	2,000			10	20,000	10	20,000
National Road	km							
Local Road	km	90,000	2	180,000	3	270,000	3	270,000
Express Highway	km							
Sub-Total (₩ 10^3)				358,820		719,700		1,088,410
($)				740		1,484		2,244
Total (₩ 10^3)				6,489,724		8,736,779		12,432,824
US $ Equivalent ($ 10^3)				13,381		18,014		25,635

Table 0 10 Continued (23)

Ganhyeon site

Item	Unit	Unit Cost (₩ 10^3)	El. 100 m Quantity	El. 100 m Amount	El. 105 m Quantity	El. 105 m Amount	El. 110 m Quantity	El. 110 m Amount
Land								
Paddy Field	ha	10,666	735	7,839,510	1,086	11,583,276	1,235	13,172,510
Upland	ha	9,503	479	4,554,332	491	4,668,428	659	6,265,772
Housing Lot	ha	11,483	32	367,456	45	516,735	50	574,150
Forest Land	ha	791	670	529,970	786	621,726	866	685,006
Others	ha		514		682		940	
Sub-Total (₩ 10^3)			2,430	13,291,268	3,090	17,390,165	3,750	20,697,438
($)				27,405		35,856		42,675
Ground Facilities and Others								
House	Nos.	600	751	450,600	1,051	630,600	1,130	678,000
Appurtenant	Nos.	150	150	22,500	210	31,500	239	35,850
Perennial Crop	Nos.	10	40,000	400,000	45,000	450,000	49,000	490,000
Grave	Nos.	30	500	15,000	630	18,900	730	21,900
Business Right	Nos.	500	20	10,000	20	10,000	28	14,000
Public Facilities	Pyong	200	2,000	400,000	2,000	400,000	2,260	452,000
Transportation Cost for Resettlement	Household	150	751	112,650	1,051	157,650	1,130	169,500
Solatium for Resettlement	Person	20	3,680	73,600	5,150	103,000	6,610	132,200
Communication Facilities	km	1,500	23	34,500	23	34,500	23	34,500
Power Distribution Facilities	km	2,000	26	52,000	26	52,000	26	52,000
National Road	km	130,000	5	650,000	5	650,000	6	780,000
Local Road	km	90,000	3	270,000	5	450,000	5	450,000
Express Highway	km	300,000	0.1	30,000	1.1	330,000	1.2	360,000
Sub-Total (₩ 10^3)				2,520,850		3,318,150		3,669,950
($)				5,197		6,842		7,567
Total (₩ 10^3)				15,812,118		20,708,315		24,367,388
US $ Equivalent ($ 10^3)				32,602		42,698		50,242

Table 0 10 Continued (24)

Ganhyeon site

Item	Unit	Unit Cost (₩ 10^3)	El. 115 m Quantity	El. 115 m Amount	El. 120 m Quantity	El. 120 m Amount
Land						
Paddy Field	ha	10,666	1,425	15,199,050	1,445	15,412,370
Upland	ha	9,508	768	7,302,144	868	8,252,944
Housing Lot	ha	11,483	73	838,259	100	1,148,300
Forest Land	ha	791	904	715,064	1,162	919,142
Others	ha		1,080		1,172	
Sub-Total (₩ 10^3)			4,250	24,054,517	4,747	25,732,756
($)				49,597		53,057
Ground Facilities and Others						
House	Nos.	600	1,150	690,000	2,300	1,380,000
Appurtenant	Nos.	150	317	47,550	412	61,800
Perennial Crop	Nos.	10	49,000	490,000	50,200	502,000
Grave	Nos.	30	740	22,200	740	22,200
Business Right	Nos.	500	28	14,000	58	29,000
Public Facilities	Pyong	200	2,300	460,000	3,300	660,000
Transportation Cost for Resettlement	Household	150	1,150	172,500	2,300	345,000
Solatium for Resettlement	Person	20	6,700	134,000	13,800	276,000
Communication Facilities	km	1,500	23	34,500	23	34,500
Power Distribution Facilities	km	2,000	26	52,000	26	52,000
National Road	km	130,000	7	910,000	8	1,040,000
Local Road	km	90,000	5	450,000	6	540,000
Express Highway	km	300,000	1.5	450,000	1.7	510,000
Sub-Total (₩ 10^3)				3,926,750		5,452,500
($)				8,096		11,242
Total (₩ 10^3)				27,981,267		31,185,256
US $ Equivalent ($ 10^3)				57,693		64,299

Table 0 10 Continued (25)

Bonghwa (upstream) site

Item	Unit	Unit Cost (₩ 10^3)	El. 270 m Quantity	El. 270 m Amount	El. 275 m Quantity	El. 275 m Amount	El. 280 m Quantity	El. 280 m Amount
Land								
Paddy Field	ha	9,530	100	953,000	127	1,210,310	146	1,391,380
Upland	ha	6,594	348	2,294,712	360	2,373,840	410	2,703,540
Housing Lot	ha	7,093	7	49,651	7	49,651	8	56,744
Forest Land	ha	756	625	472,500	648	489,888	691	522,396
Others	ha		310		328		374	
Sub-Total (₩ 10^3)			1,390	3,769,863	1,470	4,123,689	1,629	4,674,060
($)				7,773		8,502		9,637
Ground Facilities and Others								
House	Nos.	600	402	241,200	410	246,000	480	288,000
Appurtenant	Nos.	150	245	36,750	250	37,500	260	39,000
Perennial Crop	Nos.	10	1,650	16,500	1,700	17,000	1,800	18,000
Grave	Nos.	30	18	540	20	600	25	750
Business Right	Nos.	500	36	18,000	36	18,000	37	18,500
Public Facilities	Pyong	200	1,200	240,000	1,200	240,000	1,200	240,000
Transportation Cost for Resettlement	Household	150	402	60,300	410	61,500	480	72,000
Solatium for Resettlement	Person	20	1,487	29,740	1,640	32,800	2,016	40,320
Communication Facilities	km	1,500	8	12,000	8	12,000	8	12,000
Power Distribution Facilities	km	2,000	8	16,000	8	16,000	8	16,000
National Road	km							
Local Road	km	90,000	10	900,000	10	900,000	10	900,000
Express Highway	km							
Sub-Total (₩ 10^3)				1,571,030		1,581,400		1,644,570
($)				3,239		3,261		3,391
Total (₩ 10^3)				5,340,893		5,705,089		6,318,630
US $ Equivalent ($ 10^3)				11,012		11,763		13,028

Table 0 10 Continued (26)

Bonghwa (upstream) site

Item	Unit	Unit Cost (₩ 10^3)	El. 285 m Quantity	El. 285 m Amount	El. 290 m Quantity	El. 290 m Amount	El. 295 m Quantity	El. 295 m Amount
Land								
Paddy Field	ha	9,530	168	1,601,040	171	1,629,630	175	1,667,750
Upland	ha	6,594	461	3,039,834	505	3,329,970	575	3,791,550
Housing Lot	ha	7,093	8	56,744	8.5	60,290	9	63,837
Forest Land	ha	756	808	610,848	93.5	706,860	1,038	784,728
Others	ha		431		509.5		610	
Sub-Total (₩ 10^3)			1,876	5,308,466	2,129	5,726,750	2,407	6,307,865
($)				10,945		11,808		13,006
Ground Facilities and Others								
House	Nos.	600	510	306,000	620	372,000	650	390,000
Appurtenant	Nos.	150	270	40,500	280	42,000	300	45,000
Perennial Crop	Nos.	10	2,000	20,000	2,100	21,000	2,300	23,000
Grave	Nos.	30	30	900	30	900	32	960
Business Right	Nos.	500	40	20,000	43	21,500	45	22,500
Public Facilities	Pyong	200	1,250	250,000	1,300	260,000	1,300	260,000
Transportation Cost for Resettlement	Household	150	510	76,500	620	93,000	650	97,500
Solatium for Resettlement	Person	20	2,193	43,860	2,666	53,320	2,990	59,800
Communication Facilities	km	1,500	9	13,500	9	13,500	10	15,000
Power Distribution Facilities	km	2,000	9	18,000	9	18,000	10	20,000
National Road	km							
Local Road	km	90,000	11	990,000	11	990,000	12	1,080,000
Express Highway	km							
Sub-Total (₩ 10^3)				1,779,260		1,885,220		2,013,760
($)				3,669		3,887		4,152
Total (₩ 10^3)				7,087,726		7,611,970		8,321,625
US $ Equivalent ($ 10^3)				14,614		15,695		17,158

Table 0 10 Continued (27)

Bonghwa (upstream) site

Item	Unit	Unit Cost (₩ 10^3)	El. 300 m Quantity	El. 300 m Amount	El. 305 m Quantity	El. 305 m Amount	El. 310 m Quantity	El. 310 m Amount
Land								
Paddy Field	ha	9,530	185	1,763,050	196	1,867,880	210	2,001,300
Upland	ha	6,594	601	3,962,994	708	4,668,552	798	5,262,012
Housing Lot	ha	7,093	12	85,116	13	92,209	14	99,302
Forest Land	ha	756	1,306	987,336	1,455	1,099,980	1,545	1,168,020
Others	ha		628		708		783	
Sub-Total (₩ 10^3)			2,732	6,798,496	3,080	7,728,621	3,350	8,530,634
($)				14,017		15,935		17,589
Ground Facilities and Others								
House	Nos.	600	760	456,000	870	522,000	980	588,000
Appurtenant	Nos.	150	310	46,500	320	48,000	330	49,500
Perennial Crop	Nos.	10	2,500	25,000	3,000	30,000	3,200	32,000
Grave	Nos.	30	40	1,200	50	1,500	50	1,500
Business Right	Nos.	500	50	25,000	51	25,500	52	26,000
Public Facilities	Pyong	200	1,300	260,000	1,300	260,000	1,400	280,000
Transportation Cost for Resettlement	Household	150	760	114,000	870	130,500	980	147,000
Solatium for Resettlement	Person	20	3,420	68,400	3,915	78,300	4,410	88,200
Communication Facilities	km	1,500	12	18,000	14	21,000	14	21,000
Power Distribution Facilities	km	2,000	12	24,000	14	28,000	14	28,000
National Road	km							
Local Road	km	90,000	15	1,350,000	17	1,530,000	20	1,800,000
Express Highway	km							
Sub-Total (₩ 10^3)				2,388,100		2,674,800		3,061,200
($)				4,924		5,515		6,312
Total (₩ 10^3)				9,186,596		10,403,421		11,591,834
US $ Equivalent ($ 10^3)				18,941		21,450		23,901

Table 0 10 Continued (28)

Bonghwa (downstream) site

Item	Unit	Unit Cost (₩ 10^3)	El. 250 m Quantity	El. 250 m Amount	El. 255 m Quantity	El. 255 m Amount	El. 260 m Quantity	El. 260 m Amount
Land								
Paddy Field	ha	9,530	95	905,350	100	953,000	125	1,191,250
Upland	ha	6,594	118	778,092	185	1,219,890	230	1,516,620
Housing Lot	ha	7,093	5.3	37,592	6	42,558	7	49,651
Forest Land	ha	756	420	317,520	456	344,736	506	382,536
Others	ha		238		249		256	
Sub-Total (₩ 10^3)			876.3	2,038,554	996	2,560,184	1,124	3,140,057
($)				4,203		5,279		6,474
Ground Facilities and Others								
House	Nos.	600	400	240,000	410	246,000	440	264,000
Appurtenant	Nos.	150	230	34,500	240	36,000	245	36,750
Perennial Crop	Nos.	10	1,400	14,000	1,500	15,000	1,600	16,000
Grave	Nos.	30	5	150	10	300	18	540
Business Right	Nos.	500	25	12,500	32	16,000	34	17,000
Public Facilities	Pyong	200	1,070	214,000	1,100	220,000	1,170	234,000
Transportation Cost for Resettlement	Household	150	400	60,000	405	60,750	410	61,500
Solatium for Resettlement	Person	20	1,400	28,000	1,450	29,000	1,470	29,400
Communication Facilities	km	1,500	9	13,500	9	13,500	9	13,500
Power Distribution Facilities	km	2,000	9	18,000	9	18,000	9	18,000
National Road	km							
Local Road	km	90,000	8	720,000	9	810,000	10	900,000
Express Highway	km							
Sub-Total (₩ 10^3)				1,354,650		1,464,550		1,590,690
($)				2,793		3,019		3,280
Total (₩ 10^3)				3,393,204		4,024,734		4,730,747
US $ Equivalent ($ 10^3)				6,996		8,298		9,754

Table 0 10 Continued (29)

Bonghwa (downstream) site

Item	Unit	Unit Cost (₩ 10^3)	El. 265 m Quantity	El. 265 m Amount	El. 270 m Quantity	El. 270 m Amount	El. 275 m Quantity	El. 275 m Amount
Land								
Paddy Field	ha	9,530	130	1,238,900	150	1,429,500	160	1,524,800
Upland	ha	6,594	235	1,549,590	310	2,044,140	375	2,472,750
Housing Lot	ha	7,093	7	49,651	7	49,651	7	49,651
Forest Land	ha	756	709	536,004	750	567,000	758	573,048
Others	ha		269		333		350	
Sub-Total (₩ 10^3)			1,350	3,374,145	1,550	4,090,291	1,650	4,620,249
($)				6,957		8,433		9,526
Ground Facilities and Others								
House	Nos.	600	445	267,000	450	270,000	470	282,000
Appurtenant	Nos.	150	255	38,250	260	39,000	270	40,500
Perennial Crop	Nos.	10	1,700	17,000	1,800	18,000	2,000	20,000
Grave	Nos.	30	20	600	28	840	30	900
Business Right	Nos.	500	35	17,500	36	18,000	36	18,000
Public Facilities	Pyong	200	1,200	240,000	1,260	252,000	1,300	260,000
Transportation Cost for Resettlement	Household	150	450	67,500	462	69,300	470	70,500
Solatium for Resettlement	Person	20	1,480	29,600	1,730	34,600	1,833	36,660
Communication Facilities	km	1,500	9	13,500	9	13,500	9	13,500
Power Distribution Facilities	km	2,000	9	18,000	9	18,000	9	18,000
National Road	km							
Local Road	km	90,000	11	990,000	12	1,080,000	12	1,080,000
Express Highway	km							
Sub-Total (₩ 10^3)				1,698,950		1,813,240		1,840,060
($)				3,503		3,739		3,794
Total (₩ 10^3)				5,073,095		5,903,531		6,460,309
US $ Equivalent ($ 10^3)				10,460		12,172		13,320

Table 0 10 Continued (30)

Bonghwa (downstream) site

Item	Unit	Unit Cost (₩ 10^3)	El. 280 m		El. 285 m		El. 290 m	
			Quantity	Amount	Quantity	Amount	Quantity	Amount
Land								
Paddy Field	ha	9,530	175	1,667,750	180	1,715,400	185	1,763,050
Upland	ha	6,594	455	3,000,270	514	3,389,316	599	3,949,806
Housing Lot	ha	7,093	8	56,744	8	56,744	10	70,930
Forest Land	ha	756	882	666,792	1,047	791,532	1,051	794,556
Others	ha		410		471		575	
Sub-Total (₩ 10^3)			1,930	5,391,556	2,220	5,952,992	2,420	6,578,342
($)				11,116		12,274		13,564
Ground Facilities and Others								
House	Nos.	600	540	324,000	601	360,600	704	422,400
Appurtenant	Nos.	150	280	42,000	300	45,000	310	46,500
Perennial Crop	Nos.	10	2,100	21,000	2,300	23,000	2,350	23,500
Grave	Nos.	30	30	900	35	1,050	35	1,050
Business Right	Nos.	500	40	20,000	43	21,500	48	24,000
Public Facilities	Pyong	200	1,300	260,000	1,300	260,000	1,300	260,000
Transportation Cost for Resettlement	Household	150	540	81,000	601	90,150	704	105,600
Solatium for Resettlement	Person	20	2,106	42,120	2,344	46,880	2,746	54,920
Communication Facilities	km	1,500	9	13,500	9	13,500	10	15,000
Power Distribution Facilities	km	2,000	9	18,000	9	18,000	10	20,000
National Road	km							
Local Road	km	90,000	12	1,080,000	12	1,080,000	13	1,170,000
Express Highway	km							
Sub-Total (₩ 10^3)				1,902,520		1,959,680		2,142,970
($)				3,923		4,041		4,418
Total (₩ 10^3)				7,294,076		7,912,672		8,721,312
US $ Equivalent ($ 10^3)				15,039		16,315		17,982

Table 0 10 Continued (31)

Bonghwa (downstream) site

Item	Unit	Unit Cost (₩ 10^3)	El. 295 m Quantity	El. 295 m Amount	El. 300 m Quantity	El. 300 m Amount	El. 305 m Quantity	El. 305 m Amount
Land								
Paddy Field	ha	9,530	190	1,810,700	240	2,287,200	252	2,401,560
Upland	ha	6,594	712	4,694,928	738	4,866,372	846	5,578,524
Housing Lot	ha	7,093	10	70,930	12	85,116	14	99,302
Forest Land	ha	756	1,097	829,332	1,480	1,118,880	1,633	1,234,548
Others	ha		631		780		865	
Sub-Total (₩ 10^3)			2,640	7,405,890	3,250	8,357,568	3,610	9,313,934
($)				15,270		17,232		19,204
Ground Facilities and Others								
House	Nos.	600	799	479,400	919	551,400	1,085	651,000
Appurtenant	Nos.	150	320	48,000	325	48,750	330	49,500
Perennial Crop	Nos.	10	2,900	29,000	3,100	31,000	3,200	32,000
Grave	Nos.	30	35	1,050	40	1,200	50	1,500
Business Right	Nos.	500	51	25,500	51	25,500	51	25,500
Public Facilities	Pyong	200	1,300	260,000	1,300	260,000	1,300	260,000
Transportation Cost for Resettlement	Household	150	799	119,850	919	137,850	1,085	162,750
Solatium for Resettlement	Person	20	3,116	62,320	3,584	71,680	4,232	84,640
Communication Facilities	km	1,500	12	18,000	12	18,000	15	22,500
Power Distribution Facilities	km	2,000	12	24,000	12	24,000	15	30,000
National Road	km							
Local Road	km	90,000	15	1,350,000	17	1,530,000	18	1,620,000
Express Highway	km							
Sub-Total (₩ 10^3)				2,417,120		2,699,380		2,939,390
($)				4,984		5,566		6,061
Total (₩ 10^3)				9,823,010		11,056,948		21,253,324
US $ Equivalent ($ 10^3)				20,254		22,798		25,265

Table 0 10 Continued (32)

Bonghwa (downstream) site

Item	Unit	Unit Cost (₩ 10^3)	El. 310 m Quantity	El. 310 m Amount
Land				
Paddy Field	ha	9,530	262	2,496,860
Upland	ha	6,594	866	5,710,404
Housing Lot	ha	7,093	16	113,488
Forest Land	ha	756	2,175	1,644,300
Others	ha		991	
Sub-Total (₩ 10^3)			4,310	9,965,052
($)				20,547
Ground Facilities and Others				
House	Nos.	600	1,271	762,600
Appurtenant	Nos.	150	350	52,500
Perennial Crop	Nos.	10	3,300	33,000
Grave	Nos.	30	50	1,500
Business Right	Nos.	500	58	29,000
Public Facilities	Pyong	200	1,650	330,000
Transportation Cost for Resettlement	Household	150	1,271	190,650
Solatium for Resettlement	Person	20	4,957	99,140
Communication Facilities	km	1,500	15	22,500
Power Distribution Facilities	km	2,000	15	30,000
National Roadk	km			
Local Road	km	90,000	22	1,980,000
Express Highway	km			
Sub-Total (₩ 10^3)				3,530,890
($)				7,280
Total (₩ 10^3)				13,495,942
US $ Equivalent ($ 10^3)				27,827

Table 0 10 Continued (33)

Imha site

Item	Unit	Unit Cost (₩ 10^3)	El. 180 m Quantity	El. 180 m Amount	El. 185 m Quantity	El. 185 m Amount	El. 190 m Quantity	El. 190 m Amount
Land								
Paddy Field	ha	9,915	493	4,888,095	650	6,444,750	710	7,039,650
Upland	ha	6,900	460	3,174,000	580	4,002,000	750	5,175,000
Housing Lot	ha	7,366	50	368,300	55	405,130	70	515,620
Forest Land	ha	756	460	347,760	1,160	876,960	1,985	1,500,660
Others	ha		522		860		1,110	
Sub-Total (₩ 10^3)			1,985	8,778,155	3,305	11,728,840	4,625	14,230,930
($)				18,099		24,183		29,342
Ground Facilities and Others								
House	Nos.	600	1,980	1,188,000	2,100	1,260,000	2,150	1,290,000
Appurtenant	Nos.	150	800	120,000	850	127,500	870	130,500
Perennial Crop	Nos.	10	32,000	320,000	34,000	340,000	36,000	360,000
Grave	Nos.	30	410	12,300	410	12,300	410	12,300
Business Right	Nos.	500	185	92,500	195	97,500	210	105,000
Public Facilities	Pyong	200	6,000	1,200,000	6,000	1,200,000	7,000	1,400,000
Transportation Cost for Resettlement	Household	150	2,100	315,000	2,100	315,000	2,150	322,500
Solatium for Resettlement	Person	20	11,720	234,400	11,720	234,400	11,810	236,200
Communication Facilities	km	1,500	21	31,500	23	34,500	25	37,500
Power Distribution Facilities	km	2,000	21	42,000	23	46,000	25	50,000
National Road	km	130,000	18	2,340,000	20	2,600,000	23	2,990,000
Local Road	km	90,000					10	900,000
Express Highway	km							
Sub-Total (₩ 10^3)				5,895,700		6,267,200		7,834,000
($)				12,156		12,922		16,153
Total (₩ 10^3)				14,673,855		17,996,040		22,064,930
US $ Equivalent ($ 10^3)				30,225		37,105		45,495

Table 0 10 Continued (34)

Imha site

Item	Unit	Unit Cost (₩ 10^3)	El. 195 m Quantity	El. 195 m Amount	El. 200 m Quantity	El. 200 m Amount
Land						
Paddy Field	ha	9,915	760	7,535,400	780	7,733,700
Upland	ha	6,900	810	5,589,000	920	6,348,000
Housing Lot	ha	7,366	79	581,914	83	611,378
Forest Land	ha	756	2,390	1,806,840	2,826	2,136,456
Others	ha		1,346		1,536	
Sub-Total (₩ 10^3)			5,385	15,513,154	6,145	16,829,534
($)				31,986		34,700
Ground Facilities and Others						
House	Nos.	600	2,210	1,326,000	2,560	1,536,000
Appurtenant	Nos.	150	900	135,000	910	136,500
Perennial Crop	Nos.	10	38,000	380,000	40,000	400,000
Grave	Nos.	30	500	15,000	500	15,000
Business Right	Nos.	500	210	105,000	210	105,000
Public Facilities	Pyong	200	7,300	1,460,000	7,300	1,460,000
Transportation Cost for Resettlement	Household	150	2,210	331,500	2,560	384,000
Solatium for Resettlement	Person	20	11,920	238,400	12,300	246,000
Communication Facilities	km	1,500	27	40,500	29	43,500
Power Distribution Facilities	km	2,000	27	54,000	29	58,000
National Road	km	130,000	27	3,510,000	30	3,900,000
Local Road	km	90,000	10	900,000	12	1,080,000
Express Highway	km					
Sub-Total (₩ 10^3)				8,495,400		9,364,000
($)				17,516		19,307
Total (₩ 10^3)				24,008,554		26,193,534
US $ Equivalent ($ 10^3)				49,502		54,007

Table 0 10 Continued (35)

Hamyang site

Item	Unit	Unit Cost (₩ 10³)	El. 350 m Quantity	El. 350 m Amount	El. 355 m Quantity	El. 355 m Amount	El. 360 m Quantity	El. 360 m Amount
Land								
Paddy Field	ha	9,619	125	1,202,375	145	1,394,755	164	1,577,516
Upland	ha	6,957	73	507,861	85	591,345	92	647,001
Housing Lot	ha	7,048	8	56,384	9	63,432	10	70,480
Forest Land	ha	786	70	55,020	79	62,094	93	73,098
Others	ha		86		100		113	
Sub-Total (₩ 10³)			362	1,821,640	418	2,111,626	473	2,368,095
($)				3,756		4,354		4,883
Ground Facilities and Others								
House	Nos.	600	271	162,600	315	189,000	359	215,400
Appurtenant	Nos.	150	54	8,100	94	14,100	107	16,350
Perennial Crop	Nos.	10	1,300	13,000	1,300	13,000	1,300	13,000
Grave	Nos.	30	30	900	30	900	30	900
Business Right	Nos.	500	10	5,000	10	5,000	12	6,000
Public Facilities	Pyong	200	842	168,400	842	168,400	842	168,400
Transportation Cost for Resettlement	Household	150	271	40,650	315	47,250	359	53,850
Solatium for Resettlement	Person	20	1,707	34,140	1,985	39,700	2,261	45,220
Communication Facilities	km	1,500	3	4,500	3	4,500	3	4,500
Power Distribution Facilities	km	2,000	3	6,000	3	6,000	3	6,000
National Road	km							
Local Road	km	90,000	4	360,000	4	360,000	4	360,000
Express Highway	km							
Sub-Total (₩ 10³)				803,290		847,850		889,320
($)				1,656		1,748		1,833
Total (₩ 10³)				2,624,930		2,959,476		3,257,415
US $ Equivalent ($ 10³)				5,412		6,102		6,716

Table 0 10 Continued (36)

Hamyang site

Item	Unit	Unit Cost (₩ 10^3)	El. 365 m Quantity	El. 365 m Amount	El. 370 m Quantity	El. 370 m Amount	El. 375 m Quantity	El. 375 m Amount
Land								
Paddy Field	ha	9,619	178	1,712,182	190	1,827,610	204	1,962,276
Upland	ha	6,957	110	765,270	115	800,055	120	834,840
Housing Lot	ha	7,048	12	84,576	13	91,624	15	105,720
Forest Land	ha	786	105	82,530	126	99,036	130	102,180
Others	ha		128		140		160	
Sub-Total (₩ 10^3)			533	2,644,558	584	2,818,325	629	3,005,016
($)				5,453		5,811		6,196
Ground Facilities and Others								
House	Nos.	600	411	246,600	465	279,000	500	300,000
Appurtenant	Nos.	150	123	18,450	139	20,850	150	22,500
Perennial Crop	Nos.	10	1,400	14,000	1,500	15,000	1,600	16,000
Grave	Nos.	30	30	900	30	900	30	900
Business Right	Nos.	500	12	6,000	12	6,000	12	6,000
Public Facilities	Pyong	200	942	188,400	942	188,400	942	188,400
Transportation Cost for Resettlement	Household	150	411	61,650	465	69,750	500	75,000
Solatium for Resettlement	Person	20	2,589	51,780	2,929	58,580	3,150	63,000
Communication Facilities	km	1,500	3	4,500	3	4,500	3	4,500
Power Distribution Facilities	km	2,000	3	6,000	3	6,000	3	6,000
National Road	km							
Local Road	km	90,000	5	450,000	5	450,000	5	450,000
Express Highway	km							
Sub-Total (₩ 10^3)				1,048,280		1,098,980		1,132,300
($)				2,161		2,266		2,335
Total (₩ 10^3)				3,692,838		3,917,305		4,137,316
US $ Equivalent ($ 10^3)				7,614		8,077		8,531

Table 0 10 Continued (37)

Hamyang site

Item	Unit	Unit Cost (₩ 10^3)	El. 380 m Quantity	El. 380 m Amount	El. 385 m Quantity	El. 385 m Amount	El. 390 m Quantity	El. 390 m Amount
Land								
Paddy Field	ha	9,619	221	2,125,799	228	2,193,132	238	2,289,322
Upland	ha	6,957	130	904,410	132	918,324	135	939,195
Housing Lot	ha	7,048	16	112,768	20	140,960	20	140,960
Forest Land	ha	786	139	109,254	164	128,904	184	144,624
Others	ha		168		171		179	
Sub-Total (₩ 10^3)			674	3,252,231	715	3,381,320	756	3,514,101
($)				6,706		6,972		7,246
Ground Facilities and Others								
House	Nos.	600	531	318,600	551	330,600	586	351,600
Appurtenant	Nos.	150	159	23,850	165	24,750	175	26,250
Perennial Crop	Nos.	10	1,750	17,500	1,850	18,500	2,100	21,000
Grave	Nos.	30	30	900	35	1,050	40	1,200
Business Right	Nos.	500	12	6,000	12	6,000	12	6,000
Public Facilities	Pyong	200	942	188,400	942	188,400	942	188,400
Transportation Cost for Resettlement	Household	150	531	79,650	551	82,650	586	87,900
Solatium for Resettlement	Person	20	3,407	68,140	3,471	69,420	3,691	73,820
Communication Facilities	km	1,500	3	4,500	3	4,500	4	6,000
Power Distribution Facilities	km	2,000	3	6,000	3	6,000	4	8,000
National Road	km							
Local Road	km	90,000	5	450,000	5.5	495,000	6	540,000
Express Highway	km							
Sub-Total (₩ 10^3)				1,163,540		1,226,870		1,310,170
($)				2,399		2,529		2,701
Total (₩ 10^3)				4,415,771		4,608,190		4,824,271
US $ Equivalent ($ 10^3)				9,105		9,501		9,947

Table 0 10 Continued (38)

Juam site

Item	Unit	Unit Cost (₩ 10^3)	El. 107 m Quantity	El. 107 m Amount	El. 112 m Quantity	El. 112 m Amount	El. 117 m Quantity	El. 117 m Amount
Land								
Paddy Field	ha	9,634	950	9,152,300	1,100	10,597,400	1,190	11,464,460
Upland	ha	5,853	910	5,326,230	1,040	6,087,120	1,159	6,783,627
Housing Lot	ha	8,806	80	704,480	90	792,540	97	854,182
Forest Land	ha	573	1,060	607,380	1,360	779,280	1,734	993,582
Others	ha		1,550		1,560		1,573	
Sub-Total (₩ 10^3)			4,550	15,790,390	5,150	18,256,340	5,753	20,095,851
($)				32,557		37,642		41,435
Ground Facilities and Others								
House	Nos.	600	3,523	2,113,800	3,605	2,163,000	3,714	2,228,400
Appurtenant	Nos.	150	1,351	202,650	1,395	209,250	1,485	222,750
Perennial Crop	Nos.	10	26,250	262,500	26,320	263,200	26,490	264,900
Grave	Nos.	30	611	18,330	650	19,500	710	21,300
Business Right	Nos.	500	121	60,500	146	73,000	157	78,500
Public Facilities	Pyong	200	10,236	2,047,200	10,301	2,060,200	10,400	2,080,000
Transportation Cost for Resettlement	Household	150	3,621	543,150	3,682	552,300	3,778	566,700
Solatium for Resettlement	Person	20	22,168	443,360	22,252	445,040	22,323	446,460
Communication Facilities	km	1,500	39	58,500	39	58,500	39	58,500
Power Distribution Facilities	km	2,000	39	78,000	39	78,000	39	78,000
National Road	km	130,000	23	2,990,000	24	3,120,000	25	3,250,000
Local Road	km	90,000	27	2,430,000	28	2,520,000	30	2,700,000
Express Highway	km							
Sub-Total (₩ 10^3)				11,247,990		11,561,990		11,995,510
($)				23,192		23,837		24,733
Total (₩ 10^3)				27,038,380		29,818,330		32,091,361
US $ Equivalent ($ 10^3)				55,749		61,481		66,168

Table 0 10 Continued (39)

Juam site

Item	Unit	Unit Cost (₩ 10^3)	El. 122 m Quantity	El. 122 m Amount	El. 127 m Quantity	El. 127 m Amount	El. 130 m Quantity	El. 130 m Amount
Land								
Paddy Field	ha	9,634	1,230	11,849,820	1,250	12,042,500	1,851	17,832,534
Upland	ha	5,853	1,400	8,194,200	1,500	8,779,500	2,131	12,472,743
Housing Lot	ha	8,806	99	871,794	100	880,600	120	1,056,720
Forest Land	ha	573	1,761	1,009,053	2,075	1,188,975	2,175	1,246,275
Others	ha		1,580		1,585		1,981	
Sub-Total (₩ 10^3)			6,070	21,924,867	6,510	22,891,575	8,258	32,608,272
($)				45,206		47,199		67,233
Ground Facilities and Others								
House	Nos.	600	3,756	2,253,600	3,801	2,280,600	4,110	2,466,000
Appurtenant	Nos.	150	1,508	226,200	1,550	232,500	1,750	262,500
Perennial Crop	Nos.	10	26,602	266,020	26,710	267,100	31,000	310,000
Grave	Nos.	30	750	22,500	792	23,760	890	26,700
Business Right	Nos.	500	160	80,000	175	87,500	180	90,000
Public Facilities	Pyong	200	10,508	2,101,600	10,620	2,124,000	10,800	2,160,000
Transportation Cost for Resettlement	Household	150	3,806	570,900	3,887	583,050	4,110	616,500
Solatium for Resettlement	Person	20	22,401	448,020	22,511	450,220	23,510	470,200
Communication Facilities	km	1,500	39	58,500	39	58,500	49	73,500
Power Distribution Facilities	km	2,000	39	78,000	39	78,000	49	98,000
National Road	km	130,000	27	3,510,000	30	3,900,000	38	4,940,000
Local Road	km	90,000	32	2,880,000	35	3,150,000	51	4,590,000
Express Highway	km							
Sub-Total (₩ 10^3)				12,495,340		13,235,230		16,103,400
($)				25,763		27,289		33,203
Total (₩ 10^3)				34,420,207		36,126,805		48,711,672
US $ Equivalent ($ 10^3)				70,969		74,488		100,436

Table 0 11 ESTIMATE OF AGRICULTURAL PRODUCTION FOREGONE

Elavation (m)	Paddy Land Area (ha)	Paddy Land Amount (₩ 10^6)	Upland Area (ha)	Upland Amount (₩ 10^6)	Total (₩ 10^6)	Total ($ 10^3)
1. Bamseonggol (upstream) site						
260	110	27	130	68	95	196
265	137	33	148	80	113	233
270	142.5	35	196	97	132	272
275	175	43	208	124	167	344
280	204	50	231	166	216	445
285	219	53	245	182	235	485
290	229	56	265	208	264	544
295	263	64	310	227	291	600
300	282	69	342	240	309	637
305	290	71	386	259	330	680
310	310	76	393	277	353	728
2. Bamseonggol (downstream) site						
240	85	21	60	41	62	128
245	95	23	110	55	78	161
250	134	33	120	70	103	212
255	144	35	125	74	109	225
260	152	37	134	78	115	237
265	157	38	168	90	128	264
270	162	40	216	106	146	301
275	184	45	228	132	177	365
280	224	55	251	176	231	476
285	239	58	265	194	252	520
290	249	61	285	217	278	573
295	283	69	320	234	303	625
300	292	71	362	247	318	656
305	295	72	382	260	332	685
310	315	77	397	280	357	736

Table O 11 Continued (2)

Elavation (m)	Paddy Land Area (ha)	Paddy Land Amount (₩ 10^6)	Upland Area (ha)	Upland Amount (₩ 10^6)	Total (₩ 10^6)	Total ($ 10^3)
3. Inje (upstream) site						
325	153	26	378	376	402	829
330	161	28	455	399	427	880
335	169	29	483	425	454	936
340	172	30	490	436	466	961
345	187	32	530	471	503	1,037
350	198	34	620	510	544	1,122
4. Inje (downstream) site						
325	170	29	400	396	425	876
330	178	31	500	435	466	961
335	182.8	31	519	458	489	1,008
340	185	32	525	463	495	1,021
345	187	32	530	477	509	1,049
350	200	34	625	512	546	1,126
5. Hongcheon site						
114.8	1,233	212	863	561	773	1,594
119.8	1,419	244	984	634	878	1,810
124.8	1,455	250	1,282	721	971	2,002
129.8	1,541	265	1,458	780	1,045	2,155
134.8	1,592	274	1,541	811	1,085	2,237
6. Gujeol site						
720	7	1	38	11	12	25
725	12	2	59	17	19	39
730	14	2	92	25	27	56
735	20	3	110	30	33	68
740	23	3	140	38	41	85
745	33	5	160	44	49	101
750	47	6	201	56	62	128

Table 0 11 Continued (3)

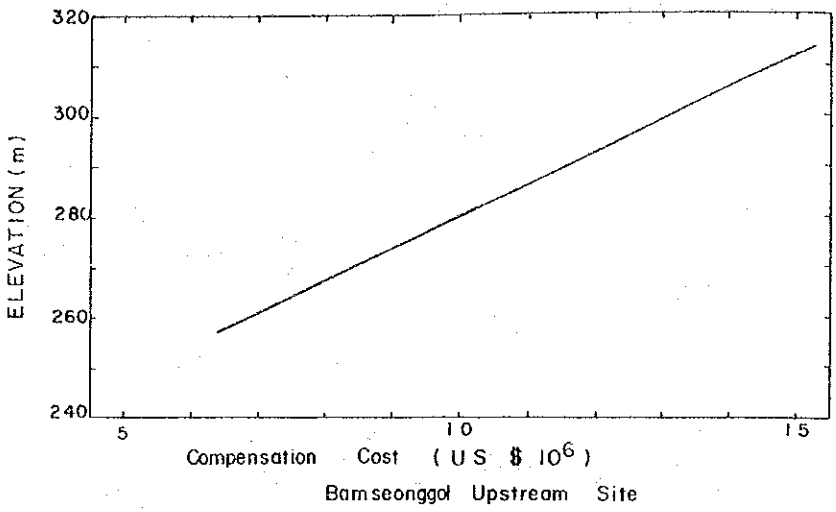
Elavation (m)	Paddy Land Area (ha)	Paddy Land Amount (₩ 10^6)	Upland Area (ha)	Upland Amount (₩ 10^6)	Total (₩ 10^6)	Total ($ 10^3)
7. Dalcheon site						
106.1	1,134	304	594	636	940	1,938
111.1	1,533	411	839	816	1,227	2,530
116.1	2,062	553	1,067	1,084	1,637	3,375
121.1	2,359	632	1,444	1,267	1,899	3,895
126.1	2,490	667	1,845	1,403	2,070	4,268
8. Ganhyeon site						
70	41	9	39	20	29	60
75	105	23	74	53	76	157
80	196	43	126	99	142	293
85	349	77	236	195	272	561
90	454	100	293	288	388	800
95	655	144	385	470	614	1,266
100	735	162	479	733	895	1,845
105	1,086	239	491	874	1,113	2,295
110	1,235	272	659	994	1,266	2,610
115	1,425	314	768	1,065	1,379	2,843
120	1,445	318	868	1,109	1,427	2,942
9. Bonghwa (upstream) site						
270	100	20	348	98	118	243
275	127	25	360	105	130	268
280	146	29	410	119	148	305
285	168	33	461	134	167	344
290	171	34	505	145	179	369
295	175	34	575	160	194	400
300	185	36	601	166	202	416
305	196	38	708	193	231	476
310	210	41	798	213	254	524

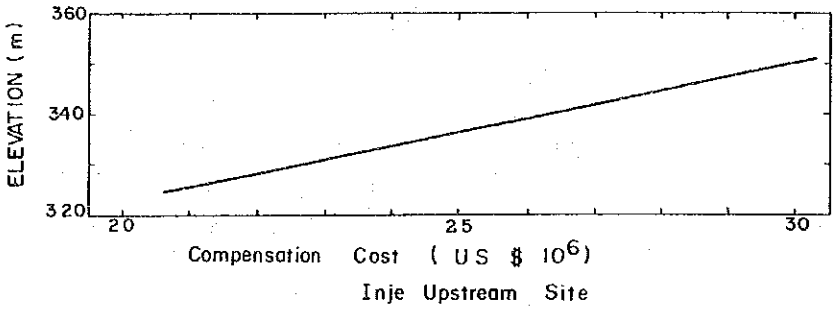
Table O 11 Continued (4)

Elavation (m)	Paddy Land Area (ha)	Paddy Land Amount (₩ 10^6)	Upland Area (ha)	Upland Amount (₩ 10^6)	Total (₩ 10^6)	Total ($ 10^3)
10. Bonghwa (downstream) site						
250	95	19	118	47	66	136
255	100	20	185	62	82	169
260	125	25	230	78	103	212
265	130	25	235	80	105	216
270	150	29	310	99	128	264
275	160	31	370	115	146	301
280	175	34	455	135	169	348
285	180	35	514	146	181	373
290	185	36	599	166	202	416
295	190	37	712	192	229	472
300	240	47	738	209	256	528
305	252	49	846	233	282	581
310	262	51	866	240	291	600
11. Imha site						
180	493	85	460	247	332	685
185	650	112	580	304	416	858
190	710	122	750	354	476	981
195	760	131	810	380	511	1,054
200	780	134	920	408	542	1,118
12. Hamyang site						
350	125	22	73	58	80	165
355	145	25	85	66	91	188
360	164	28	93	71	99	204
365	178	31	110	82	113	233
370	190	33	115	85	118	243
375	204	35	120	89	124	256
380	221	38	130	98	136	280
385	228	39	132	99	138	285
390	238	41	135	107	148	305

Table O 11 Continued (5)

Elavation (m)	Paddy Land Area (ha)	Paddy Land Amount (₩ 10^6)	Upland Area (ha)	Upland Amount (₩ 10^6)	Total (₩ 10^6)	Total ($ 10^3)
13. Juam site						
107	950	163	910	499	662	1,365
112	1,100	189	1,040	559	748	1,542
117	1,190	205	1,159	607	812	1,674
122	1,230	212	1,400	675	887	1,829
127	1,250	215	1,500	703	918	1,893
130	1,851	318	2,131	985	1,303	2,687





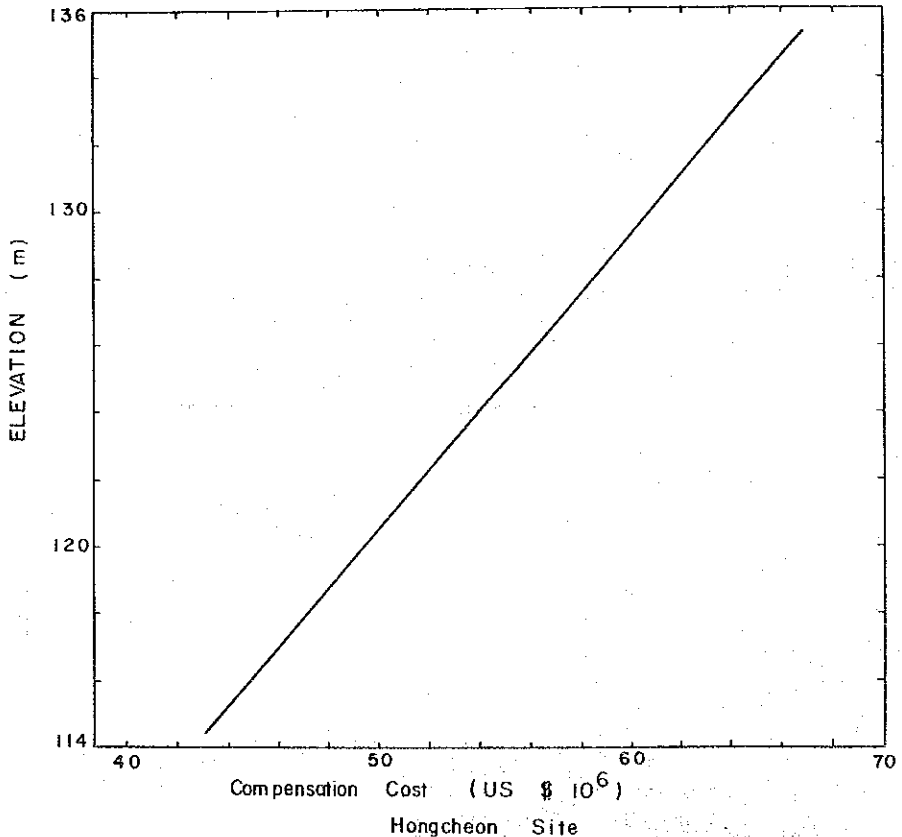


Fig.01 Stage-Compensation Cost Curve of Proposed Dam Schemes

MINISTRY OF CONSTRUCTION
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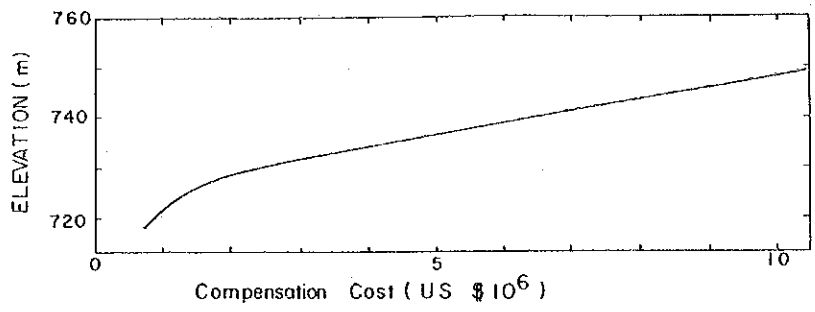
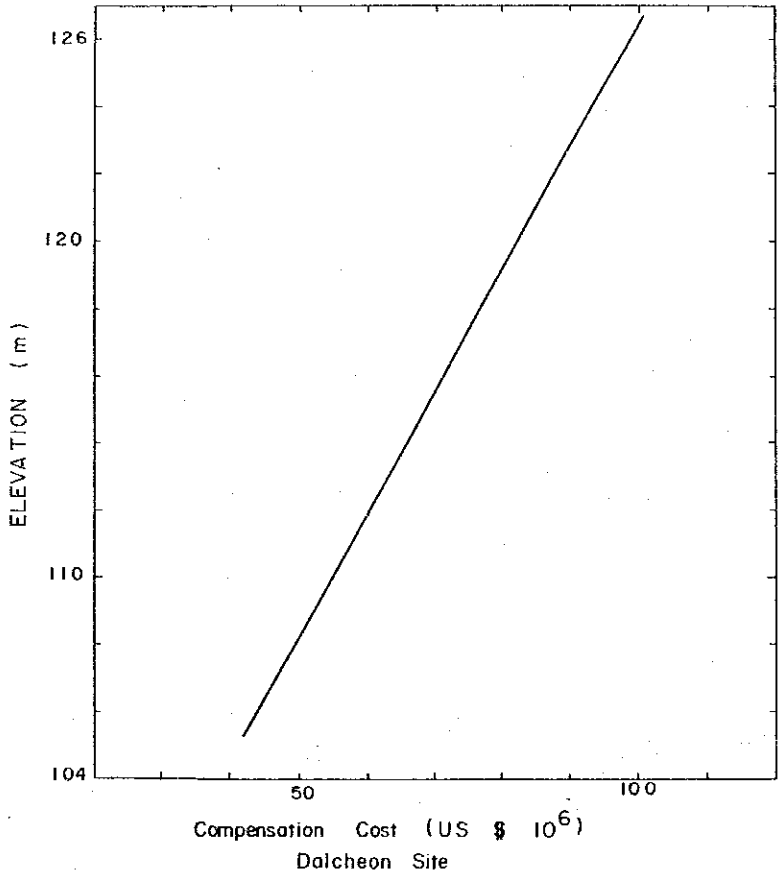
THE LONG-TERM MULTIPURPOSE DAM SCHEMES
PRELIMINARY FEASIBILITY STUDY
JAPAN INTERNATIONAL COOPERATION AGENCY





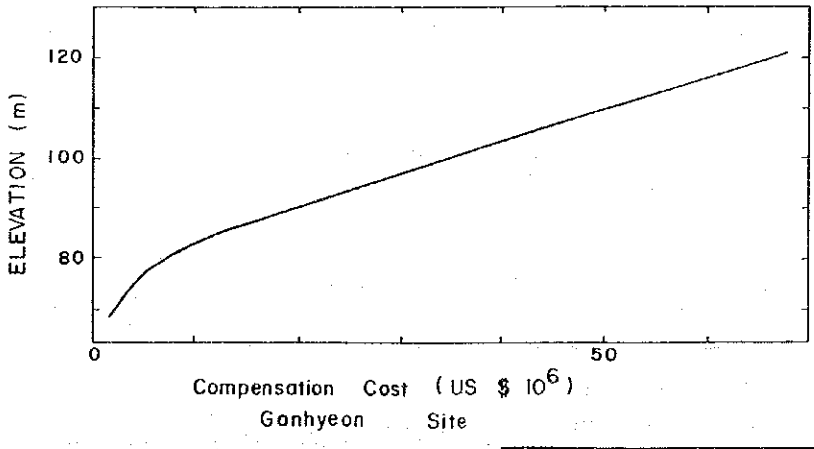
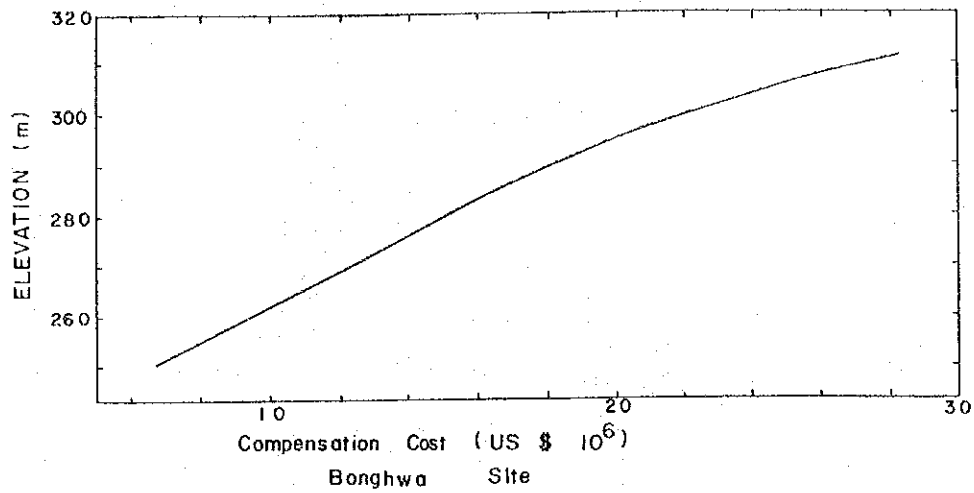
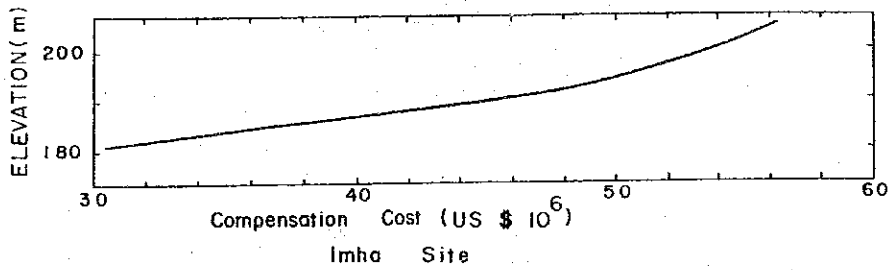
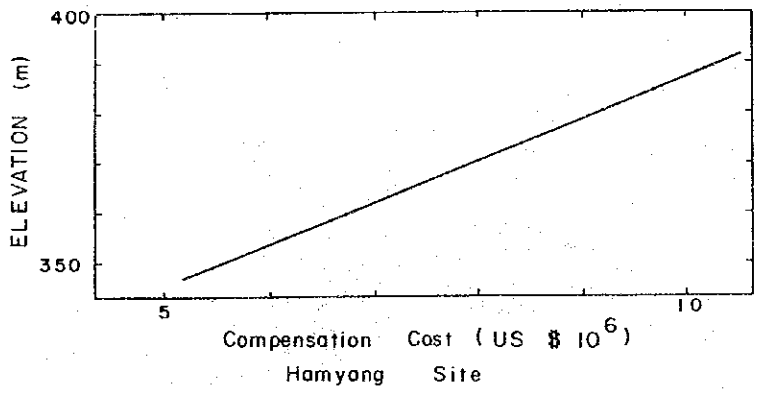


Fig.01 Stage-Compensation Cost Curve of Proposed Dam Schemes (Continued 2)

MINISTRY OF CONSTRUCTION
GOVERNMENT OF THE REPUBLIC OF KOREA
THE LONG-TERM MULTIPURPOSE DAM SCHEMES
PRELIMINARY FEASIBILITY STUDY
JAPAN INTERNATIONAL COOPERATION AGENCY







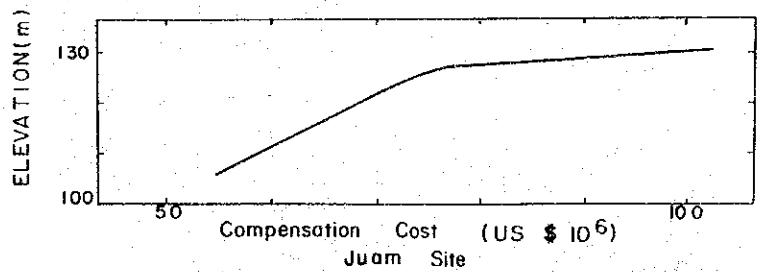
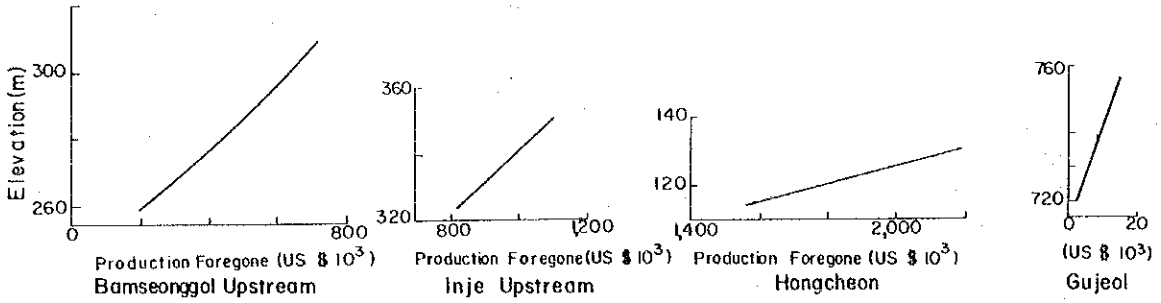
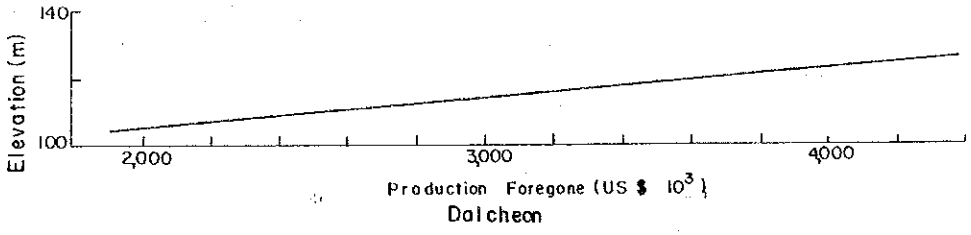
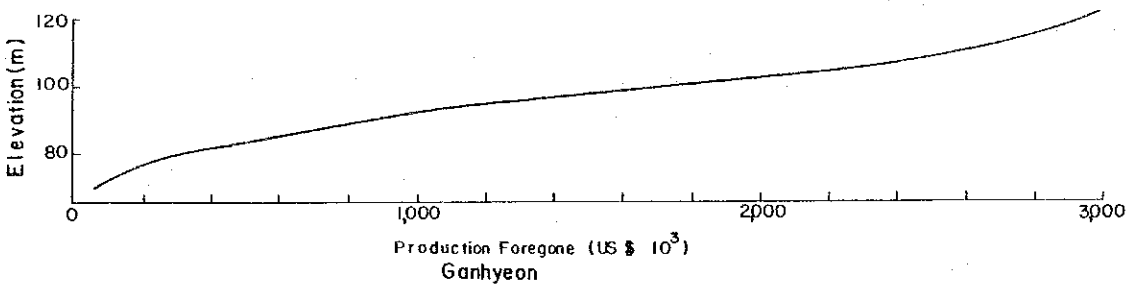


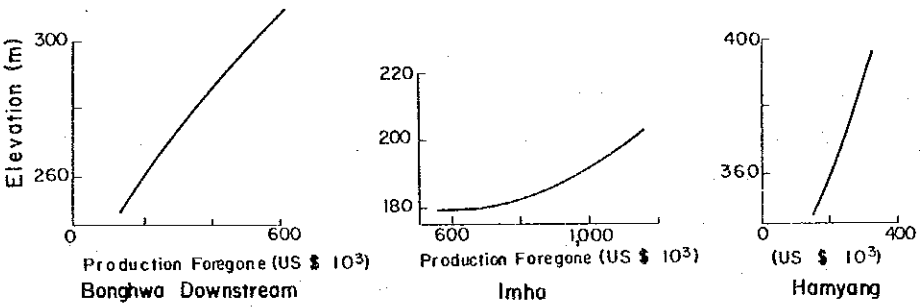
Fig.01 Stage-Compensation Cost Curve of Proposed Dam Schemes (Continued 3)

MINISTRY OF CONSTRUCTION
GOVERNMENT OF THE REPUBLIC OF KOREA
THE LONG-TERM MULTIPURPOSE DAM SCHEMES
PRELIMINARY FEASIBILITY STUDY
JAPAN INTERNATIONAL COOPERATION AGENCY









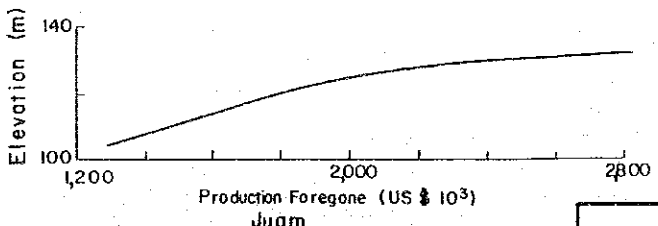


Fig. 02 Agricultural Production Foregone

MINISTRY OF CONSTRUCTION
GOVERNMENT OF THE REPUBLIC OF KOREA
THE LONG-TERM MULTIPURPOSE DAM SCHEMES
PRELIMINARY FEASIBILITY STUDY

JAPAN INTERNATIONAL COOPERATION AGENCY

A N N E X P

DESIGN AND COST ESTIMATE

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P 1 INTRODUCTION

This ANNEX presents the design criteria applied for the pre-feasibility design of the structures involved in the proposed dam schemes and their cost estimates, and M&I water supply pipeline systems associated with the Juam dam scheme.

The cost estimate of dam and power generating facilities for the study of optimization of the project was made in a wide range of alternative sizes of the proposed dams. The active storage capacity of each dam was set at 40 %, 60 %, 80 % and 100 % of the annual inflow, unless there was any constraints. Power generating facilities assuming alternative plant capacity factor of 20.8 %, 31.3 % and 41.7 % were provided.

Pre-feasibility design and cost estimate for the recommended scale of the justified dams were made thereafter and the cost curves versus dam crest elevation and installed capacity of power generating facilities shown in the Interim Report were adjusted and presented in this ANNEX. Those adjusted cost curves were used for the final study of optimization of the project.

In the Interim Report the constant draft reservoir operation only was assumed, but in the final study the variable draft operation was added. The power generating facilities were assumed only for the case of constant draft operation.

P 2 DESIGN CRITERIA

P 2.1 Basic Data

The topographic maps for the proposed damsites and power station sites were prepared by MOC in the scale of either 1/1,000 or 1/2,500. The Imha and Juam damsites were surveyed and mapped in the scale of 1/1,000 in the first stage of the study and other sites were mapped in the scale of 1/2,500 in this stage. Those surveyed maps were used for the design of dam and power station.

The reservoir area and storage capacity of each dam were measured on the map of the scale of 1/25,000 and the results are shown in Fig. P 1.

P 2.2 Design Criteria

P 2.2.1 Dam type

Concrete gravity dam and rockfill dam were studied for each damsite except for the Hongcheon dam to determine the dam type from the economical comparison among the said two dam types.

Concrete gravity dam only was applied for the Hongcheon dam, because the thin ridge on the right bank was not suitable for rockfill dam.

Other dam types such as arch dam, hollow gravity dam and homogeneous earthfill dam were not taken into consideration in the study.

Dam type adopted in the pre-feasibility design and sample design was based on the above-mentioned economical comparison study.

The typical cross section of the dam was assumed referring to the constructed and on-going dams in Korea as follows:

Concrete gravity dam

Width of crest	:	10 m
Upstream surface	:	Vertical with fillet in lower third portion (1:0.1 for sample design reproduced from the Interim Report)
Downstream surface	:	1:0.8

Rockfill dam

Central core type		
Bottom width of core zone	:	Approximate 50 % of dam height
Width of crest	:	10 m
Upstream surface slope	:	1:2.4
Downstream surface slope	:	1:2.0

P 2.2.2 Spillway

Straight open spillway with crest gates was adopted in the design.

Design flood of the dam was determined to be the 200-year flood for a concrete gravity dam and 1.2 times the 200-year flood for a rockfill dam.

The 200-year flood at each damsite was quoted from ANNEX C.

The spillway was designed to be capable of the peak design flood at the design flood water surface of the reservoir.

Horizontal stilling basin with subdam, roller bucket or flip bucket with plunge pool were adopted as the energy dissipator taking into consideration the economic superiority and riparian and social circumferences downstream of the dam. Energy dissipator was designed against 100-year flood.

P 2.2.3 Reservoir low water surface

Low water surface of the reservoir was set to be approximately 2.5 times the diameter of waterway tunnel or conduit higher than the 100-year sedimentation surface in the reservoir.

Annual yield of sediment was based on the estimation of the first stage investigation as summarized in Table P 1. It was simply assumed that the sedimentation accumulates horizontally in the bottom of the reservoir.

P 2.2.4 Flood water surface

Flood control space was provided above the high water surface in this study. Optimization of flood control space for each dam was made in ANNEX Q. As the result the flood water surface for the Imha dam was determined to be 3.0 m above the high water surface in case of the variable draft operation (HWS El. 185.0 m) and 2.0 m above the high water surface in case of the constant draft operation (HWS El. 192.0 m). The flood water surface of the Ganhyeon dam was determined to be 2.0 m above the high water surface. For other dams the flood water surface was set to be 1.0 m above the high water surface.

P 2.2.5 Freeboard of dam

Freeboard above the flood water surface to the dam crest was fixed to be 2.0 m for a concrete gravity dam and to be 3.0 m for a rockfill dam.

P 2.2.6 Design flood for river diversion during construction

Design flood for the river diversion during the construction period was assumed to be 2-year flood for a concrete dam. River flow was planned to be diverted through diversion tunnel or diversion channel during construction. The multiple stage diversion method with a diversion channel was assumed for the Juam dam.

For a rockfill dam the design flood during construction was assumed to be the larger either the experienced maximum or 50-year flood.

P 2.2.7 Power generating facilities

Power generating facilities of conventional type were assumed for every proposed dams assuming the constant draft operation in the Interim

Report. Power stations with headrace tunnel were designed for the Bamseonggol, Inje, Gujeol, Bonghwa and Hamyang dams. The Bamseonggol and the Bonghwa power stations were envisaged to utilize effectively the water head above the existing downstream Hwacheon and Andong reservoirs respectively, but the water head of about 3 m and 13 m were not used due to the topographic conditions for the Bamseonggol and Bonghwa power stations, respectively. The water head between the Inje damsite and the Soyanggan reservoir was totally utilized by the Inje power station. The Gujeol (Soncheon plan) and the Hamyang power stations were planned to utilize the water head of the steep river stretches as far as possible. The diversion plan of the Gujeol dam was prepared to utilize a high water head by diverting the Song river to the east coast. The Hongcheon, Dalcheon, Ganhyeon, Imha and Juam power stations were attached directly to the concrete gravity dam.

Two units of generating facilities were assumed in each power station. The rated water head for power generation was simply measured from the center of the high and low water surfaces. The installed capacity was calculated by the following equation.

$$P = 8.4\ QH$$

where, P = installed capacity in kW,
Q = maximum discharge in m^3/s and
H = rated net water head in m.

Power generating facilities with alternative plant capacity factor of 20.8 %, 31.3 % and 41.7 % were designed to provide the cost data of the power facilities for the optimization of the proposed dam schemes.

For the Bamseonggol, Inje and Bonghwa power stations only the plant capacity factor of 20.8 % was assumed because variable draft operation is ineffective due to existing large reservoirs located downstream.

The power and energy produced at the proposed power station was assumed to be transmitted to the existing power station or substation in the KECO system as proposed in ANNEX J.

As the result of test of power generating purpose power generating facilities of the plant factor of 20.8 % at the Gujeol (Songcheon plan), Dalcheon, Ganhyeon, Hamyang and Juam dam schemes were not justified. The Songcheon plan of the Gujeol scheme was discontinued because it was inferior to a diversion plan. Then the power facilities of the plant factor of 75 % (18 hours peak operation) was introduced to the Dalcheon and Ganhyeon dam schemes. Headrace tunnel of the Hamyang power station was shortened so that the power station was located at just downstream of the dam and the installed capacity was also reduced assuming a plant factor of 75 %. Power facilities of the Juam dam was eliminated, since the continuous firm discharge became too small due to the variable draft operation.

Reregulating dam was assumed for the Imha dam (constant draft operation) with which a power station of 5-hour peaking operation was proposed. No reregulating dam was assumed for other dam schemes, because there are reservoirs in the downstream or the daily operation hours of power stations are considerably long.

P 2.2.8 River outlet

River outlet facilities consisting mainly of Hollow jet value was assumed instead of power generating facilities for the dam of the variable draft operation.

Principal feature of the justified multipurpose dam schemes is summarized in Table P 2 and principal feature of the sample design of the unjustified dam schemes is summarized in Table P 3.

P 3 COST ESTIMATE

P 3.1 General

The estimated construction cost consisted of direct construction cost, compensation cost for the ground facilities including the relocation costs of facilities and solatium, land compensation cost, engineering and administration cost and contingency.

The direct construction cost was divided into dam cost and power generating facilities cost.

The compensation costs divided into that for the ground facilities and that on land were quoted from ANNEX O corresponding to the elevation 1 m higher than the flood water surface of the reservoir.

The engineering and administration cost was assumed to be 10 % of total direct construction cost.

A physical contingency was assumed as 20 % of all direct and indirect costs.

All the cost were estimated at 1978 price level and no price escalation was added. The interest during construction was not included.

P 3.2 Details of Cost Estimate

The direct construction cost of dam composed of civil work cost, metal work cost such as diversion closure gate, spillway gate, river outlet facilities and flood forecasting system. The cost of power facilities consisted of costs of civil works, metal works, generating equipment, transmission line and substation.

Work quantities of the civil works, such as excavation, concrete works and dam embankment were calculated from the design drawings.

Unit prices of those works were composed of labour cost, material cost, depreciation and operation cost of construction plants and machineries and contractor's overhead. Unit prices were first set by

updating the unit prices of the Soyanggang, Andong and Daecheon multi-purpose dams. The estimated unit prices of the Chungju dam was also referred to. Afterward the unit prices of dam concrete and dam embankment were reestimated taking into consideration the locality of dam materials mentioned in ANNEX M. As the result the unit price of dam concrete, $ 40/m^3, remained unchanged from the estimate in the Interim Report, but the unit price of dam embankment was altered to $ 5.5/m^3 through $ 70/m^3.

Flood forecasting system was mainly consisting of wireless rainfall observation stations, wired and wireless water level observation facilities, control center, UHF equipment for remote transmitter and receiver set, repeater station and warning station.

Cost of generating equipment and transmission line were estimated on the basis of the prevailing cost in the world.

Construction cost of the recommended scale of the justified dam schemes (pre-feasibility design) is summarized in Table P 4. Construction cost of the sample design of less economical dam schemes is shown in Table P 5. Detailed cost estimate of each dam scheme is shown in Tables P 6 through P 14.

Construction cost for alternative sizes of the proposed dam and power generating facilities was also estimated on the same basis as in the pre-feasibility and sample design and shown in Figs. P 2 and P 3.

P 4 M&I WATER SUPPLY SYSTEM ASSOCIATED WITH THE JUAM DAM

P 4.1 Studied Plans

The main purpose of the Juam dam is M&I water supply which is centered in the Gwangyang area including Yeocheon and Gwangyang as the projected demand directs.

The proposed Juam dam was studied for the main stream plan and diversion plan. In the main stream plan, the Juam dam releases total regulated flow in the river channel just downstream of it and water is taken from the downstream river channel by the water users. The diversion plan is envisaged to divert the majority of regulated flow to the southern coast by a diversion tunnel directly connected with the Juam reservoir. The diverted water will be conveyed to the demand center by a diversion pipeline which is connected with the diversion tunnel.

Three different alignments of the diversion tunnel and diversion pipeline were assumed in the study of the diversion plan. They are called Routes A, B and C.

P 4.2 Pipeline System for the Main Stream Plan

The existing Yeocheon/Gwangyang Water Supply System consists of an intake pump located in the Seomjin river 6.4 km upstream of Hadong, a tunnel, the Sueo dam and pipeline to the Gwangyang area including booster pump. Its nominal discharge capacity is 250 x 10^3 m^3/d, but the discharge capacity of the tunnel was designed to be 550 x 10^3 m^3/d to prepare for the future extension.

Based on hydrological data and the results of water budget analysis, it was assumed that the existing pipeline is operated at its full capacity for 313 days of the year but only 156 x 10^3 m^3/d of water is available on an average in the remaining 52 days.

If the Juam dam is constructed according to the main stream plan, the existing pipeline will be operated at its full capacity throughout the year and additional pipeline will be needed as the M&I water demand will grow.

The first pipeline will be constructed with a capacity of 300 x 10^3 m^3/d by utilizing the allowance in the discharge capacity of the tunnel of the existing pipeline. The necessary facilities will be six intake pumps of 8,100 PS in the total capacity for the same water head of 68 m as the existing pipeline, 15.4 km long and 1,750 mm dia. pipeline between the Hadong intake and the Gwangyang area via the Sueo dam, a primary treatment plant of 360 x 10^3 m^3/d, a regulating pond of 70,000 m^3 and a distribution pipeline of 1,200 mm in diameter and 10 km in total length.

The second pipeline will be laid separately from the existing piepline. The facilities assumed are an intake pumping station of 7,000 PS for a water head of 56 m, a 17.5 km long and 1,800 mm dia. pipeline between the intake and the Gwangyang area, a 1.5 km long and 2.5 m dia. tunnel on the mid-way of the pipeline, a primary treatment plant of 384 x 10^3 m^3/d, a regulating pond of 75 x 10^3 m^3/d and a distribution pipeline of 1,200 mm in diameter and 10 km in length. The nominal discharge capacity of the second pipeline was set to be 320 x 10^3 m^3/d, but the nominal discharge capacity of the tunnel was assumed to be 640 x 10^3 m^3/d for the common use by the third pipeline.

The discharge capacity of the third pipeline are the same with those of the second pipeline except that the tunnel constructed for the second pipeline is utilized.

For the fourth pipeline and onward, it was assumed that the facilities of the same dimensions as those of the second and third pipeline are constructed alternately.

The assumed alignment of the pipeline associated with the Juam dam main stream plan is shown in Fig. P 4. The outline and estimated financial costs are shown in Tables P 15 and P 16.

P 4.3 Pipeline System Route A for the Diversion Plan

For the diversion plan, it was assumed that the Juam dam will release enough regulated flow to the downstream to operate the existing pipeline at the full capacity and it divert all the remaining regulated flow through the diversion pipeline. The diverted discharge was calculated in accordance with the assumed high water surface of the Juam reservoir; 11.8 m^3/s for HWS El. 114, 13.1 m^3/s for HWS El. 117 m and 15 m^3/s for HWS El. 120 m.

Route A of the diversion pipeline has the shortest diversion tunnel among the proposed routes as illustrated in Fig. P 5. It conveys water by gravity. A 11 km long diversion tunnel will be excavated between the intake site in the Juam reservoir and the valley of the Isa river. The diameter will be determined between 2.9 m and 3.1 m according to the diversion discharge. The intake will be installed with a value to maintain a free flow in the tunnel irrespective of the reservoir water surface elevation. The lowest water level at the intake will be El. 85 m. The tunnel outlet will be located at about El. 70 m which is a little lower than the river bed at the outlet site. A regulating reservoir will be excavated to provide an active storage capacity of 120 x 10^3 m^3 below a high water surface of El. 70 m. A number of pipelines will be constructed in stages for a distance of 33 km between the regulating reservoir and a primary treatment plant. The principal feature of a line of the pipeline will be a 33 km long and 1,870 mm diameter of pipeline having a nominal discharge capacity of 320,000 m^3/d (3.7 m^3/s), a primary treatment plant of 384 x 10^3 m^3/d, a regulating pond of 75 x 10^3 m^3 and a distribution pipeline of 10 km in length and 1,200 mm in diameter. The outline and estimated financial costs of the diversion pipeline Route A are as shown in Tables P 17 and P 18.

P 4.4 Pipeline System Route B for the Diversion Plan

Route B was envisaged in order to increase the net water supply capacity of the diversion pipeline system by including a reservoir in the Isa river in it.

A dam will be constructed at a site which has been proposed for future M&I water supply dam called the Yeonggye dam by MOC. A 13.5 km long pressure tunnel will be constructed between the proposed Juam reservoir and Yeonggye reservoir. The diameter of the tunnel will be determined according to the diversion discharge from the Juam dam. The low water surface of the Yeonggye will be set at El. 60 m taking into account the sedimentation storage and the hydroulic gradient in the diversion tunnel in the case that the water surface of the Juam reservoir is the lowest. The high water surface elevation will be also set taking into account the relationship of the water levels of the two reservoirs. The active storage capacity will be thus determined between 90 x 10^6 m^3 and 121 x 10^6 m^3 depending on the diversion discharge.

The regulated outflow from the Isa reservoir itself will be 2.0 m^3/s to 2.4 m^3/s. The pipeline between the Yeonggye dam and a primary treatment plant will be 1,870 mm in diameter and 26 km in length with 320 x 10^3 m^3/d (3.7 m^3/s) in nominal capacity per line. The capacity of the primary treatment plant will be 384 x 10^3 m^3/d per line and the active storage capacity of the regulation pond will be 75 x 10^3 m^3. A 10 km long and 1,200 mm dia. distribution pipeline was assumed for each line. Water will be conveyed by gravity. The outline and the estimated financial costs of the diversion water supply system for Route B are shown in Tables P 19 and P 20.

P 4.5 Pipeline System Route C for the Diversion Plan

Route C was studied for the consideration if M&I or irrigation water demand would arise to the west of the Gwangyang area or there would be a problem of water pollution in the downstream reaches of the Seomjin river. A diversion tunnel will be excavated in a distance of 14 km between the Juam reservoir and Bolgyo. A regulating dam will be constructed at the tunnel outlet with an active storage capacity of 270 x 10^3 m^3. A number of pipelines will distribute water from the regulating reservoir to the demand centers. Assuming a demand center in the Gwangyang area only, the facilities per line will be a 45 km long and 1,870 mm dia. pipeline with a nominal discharge capacity of

320,000 m^3/d (3.7 m^3/s), a booster pump station of 2,000 PS for a water head of 16 m, a primary treatment plant of 384 x 10^3 m^3/d, regulating pond of 75 x 10^3 m^3 and a distribution pipeline of 1,200 mm in diameter and 10 km in length. The layout of Route C is assumed as shown in Fig. P 15. The outline and estimated financial costs are as shown in Tables P 21 and P 22.

Table P 1 ESTIMATED RESERVOIR SEDIMENTATION

Proposed Dam Site	Catchment Area (km^2)	Sediment Yield Rate ($m^3/km^2/year$)	100-year Sediment Volume (10^6 m^3)	Assumed Sediment Surface (El. m)
Bamseonggol	583	700	40.8	252
Inje	1,043	600	62.6	269
Hongcheon	1,473	500	73.6	74
Gujeol	101	600	6.0	718
Dalcheon	1,348	500	67.4	91
Ganhyeon	1,180	500	59.0	82
Bonghwa	1,135	600	68.1	223
Imhwa	1,230	400	49.2	147
Hamyang	264	700	18.5	328
Juam	823 /1	400	33.0	78

/1 Catchment area 187 km^2 of Donbog dam is shut down.

Table P 2 PRINCIPAL FEATURES OF PROPOSED MULTIPURPOSE DAM SCHEMES

Name of Dam		Bamseonggol	Hongcheon	Dalcheon	Ganhyeon
River System		North Han	North Han	South Han	South Han
1. Hydrology					
Catchment area	km^2	583	1,473	1,348	1,180
Annual rainfall	mm	1,276	1,340	1,106	1,349
Annual inflow	10^6 m^3	509	1,351	932	944
2. Reservoir					
Reservoir operation/1		C	C&V	C&V	C&V
Flood water surface	El. m	306	121	118	113.4
High water surface	El. m	305	120	117	111.4
Low water surface	El. m	264	93	101	91
Drawdown	m	41	27	16	20.4
Gross storage (HWS)	10^6 m^3	466	1,314	740	680
Dead storage	10^6 m^3	98	360	200	140
Active storage	10^6 m^3	368	954	540	540
Flood control space	10^6 m^3	16	52	53	92
Surface area (HWS)	km^2	13	49	50	39
3. Dam					
Type/2		R	CG	CG	CG
Crest elevation	El. m	309	123	120	115.4
Height	m	105	80	57	50
Crest length	m	408	420	400	307
Volume	10^3 m^3	5,170	830	410	180
Design flood	m^3/s	4,100	9,000	6,400	7,800
River outlet capacity for variable draft operation	m^3/s	-	2 x 54.45 = 109	2 x 45.15 = 90.3	2 x 44.55 = 89.1
4. Power Facilities for Constant Draft Operation					
Maximum discharge	m^3/s	61.4	162.2	31.1	29.7
Rated net head	m	96.4	53.5	35.2	27.8
Installed capacity	MW	2 x 24.8 = 49.7	2 x 36.4 = 72.9	1 x 9.2 = 9.2	1 x 6.9 = 6.9
Re-regulating dam		none	none	none	none
Transmission line	kV x cct x km	154 x 2 x 15	154 x 2 x 20	66 x 1 x 35	66 x 1 x 13

Remarks; /1: C for constant draft operation.
V for variable draft operation.

/2: R for rockfill dam.
CG for concrete gravity dam.

Table P 2 Continued (2)

Name of Dam		Imha	Juam Main Stream Plan	Juam Diversion Plan
River System		Nagdong	Seomjin	
1. Hydrology				
Catchment area	km^2	1,230	1,010	
Annual rainfall	mm	995	1,382	
Annual inflow	10^6 m^3	725	702	
2. Reservoir				
Reservoir operation		C	V	V	V
Flood water surface	El. m	194	188	112	121
High water surface	El. m	192	185	111	120
Low water surface	El. m	158	158	85	85
Drawdown	m	34	27	26	35
Gross storage (HWS)	10^6 m^3	1,060	723	528	860
Dead storage	10^6 m^3	140	140	80	80
Active storage	10^6 m^3	920	583	448	780
Flood control space	10^6 m^3	100	115	30	48
Surface area (HWS)	km^2	48	38	31	44
3. Dam				
Type	-	CG	CG	CG	CG
Crest elevation	El. m	196	190	114	123
Height	m	87	81	60	69
Crest length	m	467	410	384	410
Volume	10^3 m^3	728	610	460	610
Design flood	m^3/s	4,500	4,500	6,200	6,200
River outlet capacity for variable draft operation	m^3/s	-	2 x 13.4 = 26.8	2 x 13.6 = 27.2	1 x 9.4 = 9.4
4. Power Facilities for Constant Draft Operation					
Maximum discharge	m^3/s	92.6	-	-	-
Rated net head	m	61.2	-	-	-
Installed capacity	MW	2 x 23.8 = 47.6			
Re-regulating dam		attached	-	-	-
Transmission line	kV x cct x km	154 x 2 x 46	-	-	-

Table P 3 PRINCIPAL FEATURES OF PROPOSED MULTIPURPOSE DAM SCHEMES FOR SAMPLE DESIGN

Name of Dam		Inje	Gujeol Mainstream Plan	Gujeol Diversion Plan
River System		Han		Han
1. Hydrology				
Catchment area	km^2	1,043		101
Annual rainfall	mm	1,200		1,186
Annual inflow	10^6 m^3	857		79
2. Reservoir				
Reservoir operation	-	C	C	C
Flood water surface	El. m	347		750
Normal high water surface	El. m	344		748
Low water surface	El. m	300.6		723
Drawdown	m	43.4		25
Gross storage (NHWL)	10^6 m^3	1,300		83.2
Dead storage	10^6 m^3	330		10.0
Active storage	10^6 m^3	970		73.2
Flood control capacity	10^6 m^3	105		13
Surface area (NHWL)	km^2	31		5.8
3. Dam				
Type	-	CG		R
Crest elevation	El. m	349		753
Height	m	128		68
Crest length	m	435		250
Volume	10^3 m^3	1,688		1,107
Design flood	m^3/s	7,500		1,100
4. Power Facilities				
Maximum discharge	m^3/s	114.7	11.5	11.5
Rated net head	m	127.1	603.5	316.6
Installed capacity	MW	2 x 61.2 = 122.4	2 x 29.2 = 58.5	2 x 15.3 = 30.6
Re-regulating dam	-	none	none	none
Transmission line	kV x cct x km	154 x 2 x 45	154 x 1 x 35	154 x 1 x 20

Table P 3 Continued (2)

Name of Dam		Bonghwa	Hamyang
River System		Nagdong	Nagdong
1. Hydrology			
Catchment area	km^2	1,135	264
Annual rainfall	mm	1,033	1,422
Annual inflow	10^6 m^3	695	276
2. Reservoir			
Reservoir operation	-	C	C
Flood water surface	El. m	300	377
Normal high water surface	El. m	297	376
Low water surface	El. m	259	338
Drawdown	m	38	38
Gross storage (NHWL)	10^6 m^3	1,004	190
Dead storage	10^6 m^3	323	39
Active storage	10^6 m^3	681	151
Flood control capacity	10^6 m^3	100	6
Surface area (NHWL)	km^2	28	5.8
3. Dam			
Type	-	CG	R
Crest elevation	El. m	302	380
Height	m	129	80
Crest length	m	607	375
Volume	10^3 m^3	1,723	2,500
Design flood	m^3/s	6,000	3,400
4. Power Facilities			
Maximum discharge	m^3/s	83.5	7.0
Rated net head	m	102.6	46.0
Installed capacity	MW	2 x 36.0 = 72.0	2.7
Re-regulating dam	-	none	none
Transmission line	kV x cct x km	154 x 2 x 28	66 x 1 x 46

Table P 4 CONSTRUCTION COST OF PROPOSED MULTIPURPOSE DAM SCHEMES

(1978 price level excluding interest during construction)

Unit: $ 10^3

Name of Dam	Bamseonggol	Hongcheon	Dalcheon
DAM			
Dam			
Civil works	59,059	48,606	30,439
Metalworks	2,416	6,758	6,895
Flood forecasting system	170	946	1,177
Sub-total	61,645	56,310	38,511
Compensation			
Relocation cost of road & other ground facilities	4,600	9,400	7,300
Land compensation	9,600	41,900	75,000
Engineering Fee	6,164	5,631	3,851
Contingency	16,402	22,648	24,932
Dam Total	98,411	135,889	149,594
POWER FACILITIES			
Power Facilities			
Civil works	9,342	4,768	1,255
Metalworks	1,513	1,956	570
Generating equipment	6,958	16,767	5,060
Transmission line & substation	1,800	2,010	720
Sub-total	19,613	25,501	7,605
Engineering Fee	1,961	2,550	760
Contingency	4,315	5,610	1,673
Power Facilities Total	25,889	33,661	10,038

Table P 4 Continued (2)

(1978 price level excluding interest during construction)

Unit: $ 10^3

Name of Dam	Ganhyeon	Imha (HWS El. 192 m)	Imha (HWS El. 185 m)
DAM			
Dam			
Civil works	12,926	45,001	39,120
Metalworks	6,225	5,497	5,445
Flood forecast system	1,177	1,177	1,177
Sub-total	20,328	51,675	45,742
Compensation			
Relocation cost of road & other ground facilities	8,000	17,500	15,500
Land compensation	48,800	32,000	28,300
Engineering Fee	2,033	5,168	4,574
Contingency	15,832	21,269	18,823
Dam Total	94,993	127,612	112,939
POWER FACILITIES			
Power Facilities			
Civil works	1,673	4,016	-
Metalworks	362	2,895	-
Generating equipment	4,340	11,900	-
Transmission line & substation	434	1,800	-
Sub-total	6,809	20,611	-
Engineering Fee	681	2,061	-
Contingency	1,498	4,534	-
Power Facilities Total	8,988	27,206	-

Table P 4 Continued (3)

(1978 price level excluding interest during construction)

Unit: $ 10^3

Name of Dam	Juam (HWS El. 111 m)	Juam (HWS El. 120 m)
DAM		
Dam		
Civil works	31,098	38,591
Metalworks	6,480	5,920
Flood forecasting system	1,177	1,177
Total	38,755	45,688
Compensation		
Relocation cost of road & other ground facilities	24,000	25,700
Land compensation	38,400	45,000
Engineering Fee	3,876	4,569
Contingency	21,006	24,191
Dam Total	126,037	145,148

Table P 5 CONSTRUCTION COST OF PROPOSED MULTIPURPOSE DAM SCHEMES FOR SAMPLE DESIGN

(1978 price level excluding interest during construction)

Unit: $ 10^3

Name of Dam	Inje	Gujeol	
		Diversion Plan	Songcheon Plan
CONSTRUCTION COST			
Dam			
Civil works	89,544	14,988	
Metalworks	7,482	1,406	
Flood forecasting system	946	170	
Sub-total	97,972	16,564	
Power Facilities			
Civil works	37,448	13,440	17,238
Metalworks	6,772	16,935	2,816
Generating equipment	14,321	5,190	3,993
Transmission line & substation	3,060	1,920	1,440
Sub-total	61,601	37,485	25,487
Direct Cost Total	159,573	54,049	42,051
Compensation			
Relocation cost of road & other ground facilities	13,650	4,800	4,800
Land compensation	15,620	5,130	5,130
Engineering Fee	15,957	5,405	4,205
Contingency	40,960	13,877	11,237
Grand Total	245,760	83,261	67,423

Table P 5 Continued (2)

(1978 price level excluding interest during construction)

Unit: $ 10^3

Name of Dam	Bonghwa	Hamyang
CONSTRUCTION COST		
Dam		
Civil works	93,648	37,874
Metalworks	6,998	4,252
Flood forecasting system	946	170
Sub-total	101,592	42,296
Power Facilities		
Civil works	13,887	781
Metalworks	2,957	245
Generating equipment	9,591	2,160
Transmission line & substation	2,346	863
Sub-total	28,781	4,049
Direct Cost Total	130,373	46,345
Compensation		
Relocation cost of road & other ground facilities	5,680	2,380
Land compensation	17,550	6,500
Engineering Fee	13,037	4,634
Contingency	33,328	11,972
Grand Total	199,968	71,831

Table P 6 BREAKDOWN OF CONSTRUCTION COST OF BAMSEONGGOL MULTIPURPOSE DAM

(1978 price level)

Dam	Unit	Unit Price ($)	Bamseonggol Quantity	Bamseonggol Amount ($ 10^3)
I CIVIL WORKS				
1. Preparatory Works				
- Access road	km	100,000	6.45	645
- Construction facilities	LS	-	-	3,306
Sub-total				3,951
2. Diversion Tunnel				
- Tunnel excavation	m^3	25	188,200	4,705
- Lining concrete	m^3	60	47,320	2,839
- Steel bar	ton	500	4,732	2,366
- Miscellaneous	LS	-	-	2,973
Sub-total				12,883
3. Dam				
- Excavation	m^3	3.0	620,000	1,860
- Embankment	m^3	6.0	5,100,000	30,600
- Foundation treatment	LS	-	-	3,246
- Miscellaneous	LS	-	-	1,875
Sub-total				37,491
4. Spillway				
- Excavation	m^3	4.0	396,000	1,581
- Concrete	m^3	45	50,000	2,250
- Steel bar	ton	450	1,500	675
- Miscellaneous	LS	-	-	225
Sub-total				4,734
Total				59,059
II METALWORKS				
- Diversion gate	ton	4,000	90	360
- Spillway gate	ton	5,200	350	1,820
- River outlet facilities	LS	-	-	236
Total				2,416

Table P 6 Continued (2)

Power Facilities	Unit	Unit Price ($)	Bamseonggol Quantity	Bamseonggol Amount ($ 10^3)
I CIVIL WORKS				
1. Preparatory Works				
- Access road	km	100,000	3.1	310
- Construction facilities	LS	-	-	511
Sub-total				821
2. Intake				
- Excavation	m^3	4.0	58,000	232
- Concrete	m^3	45	3,000	135
- Steel bar	ton	450	90	40
- Miscellaneous	LS	-	-	41
Sub-total				448
3. Headrace Tunnel				
- Tunnel excavation	m^3	30	66,800	2,004
- Lining concrete	m^3	74	23,600	1,746
- Steel bar	ton	500	950	475
- Miscellaneous	LS	-	-	845
Sub-total				5,070
4. Surge Tank				
- Shaft excavation	m^3	25	30,000	750
- Concrete	m^3	60	6,000	360
- Steel bar	ton	450	360	162
- Miscellaneous	LS	-	-	254
Sub-total				1,526
5. Penstock				
- Tunnel excavation	m^3	30	1,830	55
- Lining & backfill concrete	m^3	65	650	42
- Open excavation	m^3	4.0	16,690	67
- Concrete, block etc.	m^3	50	2,390	120
- Steel bar	ton	450	50	23
- Miscellaneous	LS	-	-	77
Sub-total				384

Table P 6 Continued (3)

Power Facilities	Unit	Unit Price ($)	Bamseonggol Quantity	Bamseonggol Amount ($ 10^3)
I CIVIL WORKS (Continued)				
6. Power House, Substructure				
- Excavation	m^3	2.5	16,300	41
- Concrete	m^3	55	6,000	330
- Steel bar	ton	450	300	135
- Miscellaneous	LS	-	-	76
Sub-total				582
7. Power House				
- Superstructure	space volume m^3	55	8,000	440
8. Tailrace				
- Excavation	m^3	2.5	4,000	10
- Concrete	m^3	45	860	39
- Steel bar	ton	450	43	19
- Miscellaneous	LS	-	-	3
Sub-total				71
Total				9,342
II METALWORKS				
- Intake trashrack	ton	2,000	59	118
- Intake gate	ton	5,500	97	534
- Steel penstock	ton	2,000	390	780
- Tailrace gate	ton	4,500	18	81
Total				1,513

Table P 7 BREAKDOWN OF CONSTRUCTION COST OF HONGCHEON MULTIPURPOSE DAM

(1978 price level)

Dam	Unit	Unit Price ($)	Hongcheon Quantity	Hongcheon Amount ($ 10^3)
I CIVIL WORKS				
1. Preparatory Works				
- Access road	km	100,000	7.1	710
- Construction facilities	LS	-	-	2,711
Sub-total				3,421
2. Diversion Tunnel				
- Tunnel excavation	m^3	25	46,300	1,158
- Lining concrete	m^3	60	11,700	702
- Steel bar	ton	500	1,170	585
- Miscellaneous	LS	-	-	978
Sub-total				3,423
3. Dam & Spillway				
- Excavation	m^3	4.0	724,000	2,896
- Concrete	m^3	40	827,000	33,080
- Foundation treatment	LS	-	-	3,598
- Steel bar	ton	450	420	189
- Miscellaneous	LS	-	-	1,999
Sub-total				41,762
Total				48,606
II METALWORKS				
- Diversion gate	ton	4,000	90	360
- Spillway gate	ton	5,200	1,000	5,200
- River outlet facilities	LS	-	-	1,198
Total				6,758

Table P 7 Continued (2)

Power Facilities	Unit	Unit Price ($)	Hongcheon Quantity	Hongcheon Amount ($ 10^3)
I CIVIL WORKS				
1. Preparatory Works				
- Access road	km	-	-	-
- Construction facilities	LS	-	-	270
Sub-total				270
2. Intake				
- Concrete	m^3	45	2,530	114
- Steel bar	ton	450	127	57
- Miscellaneous	LS	-	-	17
Sub-total				188
3. Power House, Substructure				
- Excavation	m^3	2.5	40,000	100
- Concrete	m^3	55	36,000	1,980
- Steel bar	ton	450	1,800	810
- Miscellaneous	LS	-	-	434
Sub-total				3,324
4. Power House				
- Superstructure	space volume m^3	55	16,000	880
5. Tailrace				
- Concrete	m^3	45	1,500	68
- Steel bar	ton	450	75	34
- Miscellaneous	LS	-	-	5
Sub-total				106
Total				4,768
II METALWORKS				
- Intake trashrack	ton	2,000	224	448
- Intake gate	ton	5,500	140	770
- Steel penstock	ton	2,000	297	594
- Tailrace gate	ton	4,500	32	144
Total				1,956

Table P 8 BREAKDOWN OF CONSTRUCTION COST OF DALCHEON AND GANHYEON MULTIPURPOSE DAMS

(1978 price level)

Dam	Unit	Unit Price ($)	Dalcheon Quantity	Dalcheon Amount ($ 10^3)	Ganhyeon Quantity	Ganhyeon Amount ($ 10^3)
I CIVIL WORKS						
1. Preparatory Works						
- Access road	km	50,000 - 100,000	2	100	4	400
- Construction facilities	LS	-	-	1,717	-	709
Sub-total				1,817		1,109
2. Diversion Tunnel						
- Tunnel excavation	m^3	25	73,800	1,845	35,300	883
- Lining concrete	m^3	60	23,800	1,428	9,200	552
- Steel bar	ton	500	2,380	1,190	920	460
- Miscellaneous	LS	-	-	1,785	-	758
Sub-total				6,248		2,652
3. Dam & Spillway						
- Excavation	m^3	4.0	610,000	2,440	116,000	464
- Concrete	m^3	40	410,000	16,400	183,000	7,320
- Foundation treatment	LS	-	-	1,884	-	778
- Steel bar	ton	450	1,300	585	370	166
- Miscellaneous	LS	-	-	1,065	-	436
Sub-total				22,374		9,165
Total				30,439		12,926
II METALWORKS						
- Diversion gate	ton	4,000	200	800	44	176
- Spillway gate	ton	5,200	950	4,940	970	5,044
- River outlet facilities	LS	-	-	1,155	-	1,005
Total				6,895		6,225

Table P 8 Continued (2)

Power Facilities	Unit	Unit Price ($)	Dalcheon Quantity	Dalcheon Amount ($ 10^3)	Ganhyeon Quantity	Ganhyeon Amount ($ 10^3)
I CIVIL WORKS						
1. Preparatory Works						
- Access road	km	-	-	-	-	-
- Construction facilities	LS	-	-	74	-	178
Sub-total				74		178
2. Power House, Substructure						
- Excavation	m^3	2.5	20,800	52	12,700	32
- Concrete	m^3	55	4,400	242	9,600	528
- Steel bar	ton	450	200	90	480	216
- Miscellaneous	LS	-	-	58	-	116
Sub-total				442		892
3. Power House						
- Superstructure	space volume m^3	55	7,000	385	10,000	550
4. Tailrace						
- Excavation	m^3	2.5	16,000	40	-	-
- Concrete	m^3	45	4,400	198	730	33
- Steel bar	ton	450	220	99	40	18
- Miscellaneous	LS	-	-	17	-	2
Sub-total				354		53
Total				1,255		1,673
II METALWORKS						
- Intake trashrack	ton	2,000	23	46	60	120
- Intake gate	ton	5,500	33	182	23	127
- Steel penstock	ton	2,000	86	172	37	74
- Tailrace gate	ton	4,500	38	171	9	41
Total				570		362

Table P 9 BREAKDOWN OF CONSTRUCTION COST OF IMHA MULTIPURPOSE DAM

Dam	Unit	Unit Price ($)	Imha HWS El. 192 m Quantity	Imha HWS El. 192 m Amount ($ 10^3)	Imha HWS El. 185 m Quantity	Imha HWS El. 185 m Amount ($ 10^3)
I CIVIL WORKS						
1. Preparatory Works						
- Access road	km	70,000	5	350	5	350
- Construction facilities	LS	-	-	2,527	-	2,194
Sub-toal				2,877		2,544
2. Diversion Tunnel						
- Tunnel excavation	m^3	25	66,300	1,658	64,900	1,622
- Lining concrete	m^3	60	22,000	1,320	21,700	1,302
- Steel bar	ton	500	2,200	1,100	2,170	1,085
- Miscellaneous	LS	-	-	1,631	-	1,604
Sub-total				5,709		5,613
3. Dam & Spillway						
- Excavation	m^3	4	530,000	2,120	510,000	2,040
- Concrete	m^3	40	726,000	29,040	610,000	24,400
- Foundation treatment	LS	-	-	3,116	-	2,644
- Steel bar	ton	450	900	405	900	405
- Miscellaneous	LS	-	-	1,734	-	1,474
Sub-total				36,415		30,963
Total				45,001		39,120
II METALWORKS						
- Diversion gate	ton	4,000	180	720	180	720
- Spillway gate	ton	5,200	800	4,160	800	4,160
- River outlet facilities	LS	-	-	617	-	565
Total				5,497		5,445

Table P 9 Continued (2)

Power Facilities	Unit	Unit Price ($)	Imha HWS. El. 192 m Quantity	Imha HWS. El. 192 m Amount ($ 10^3)	Imha HWS El. 185 m Quantity	Imha HWS El. 185 m Amount ($ 10^3)
I CIVIL WORKS						
1. Preparatory Works						
- Access road	km	-	-	-	-	-
- Construction facilities	LS	6 %	-	227	-	214
Sub-total				227		214
2. Power House, Substructure						
- Excavation	m^3	2.5	16,600	42	15,200	38
- Concrete	m^3	55	14,000	770	12,800	704
- Steel bar	ton	450	700	315	640	288
- Miscellaneous	LS	-	-	169	-	155
Sub-total				1,295		1,185
3. Power House						
- Superstructure	space volume m^3	55	15,600	858	14,000	770
4. Tailrace						
- Excavation	m^3	2.5	11,400	28	10,400	26
- Concrete	m^3	45	3,100	140	2,800	126
- Steel bar	ton	450	150	68	140	63
- Miscellaneous	LS	-	-	12	-	11
Sub-total				248		226
5. Reregulating Weir						
- Excavation	m^3	3	19,000	57	19,000	57
- Concrete	m^3	45	18,000	810	18,000	810
- Bypass, foundation treatment control facilities & miscellaneous	LS	-	-	521	-	521
Sub-total				1,388		1,388
Total				4,016		3,783
II METALWORKS						
- Intake trashrack	ton	2,000	80	160	70	140
- Intake gate	ton	5,500	110	605	95	522
- Steel penstock	ton	2,000	390	780	370	740
- Tailrace gate	ton	4,500	80	360	60	270
- Reregulating gate	ton	4,500	220	990	220	990
Total				2,895		2,662

Table P 10 BREAKDOWN OF CONSTRUCTION COST OF JUAM MULTIPURPOSE DAM

(1978 price level)

Dam	Unit	Unit Price ($)	Juam HWL El. 111 m Quantity	Juam HWL El. 111 m Amount ($ 10^3)	Juam HWL El. 120 m Quantity	Juam HWL El. 120 m Amount ($ 10^3)
I CIVIL WORKS						
1. Preparatory Works						
- Access road	km	20,000	1.25	25	1.25	25
- Construction facilities	LS	-	-	1,864	-	2,183
Sub-total				1,889		2,208
2. Diversion Channel						
- Excavation	m^3	3.5	653,000	2,612	653,000	2,612
- Concrete	m^3	40	31,200	1,248	31,200	1,248
- Steel bar	ton	500	200	500	200	100
- Miscellaneous	LS	-	-	792	-	792
Sub-total				4,752		4,752
3. Dam & Spillway						
- Excavation	m^3	4.0	530,000	2,120	583,000	2,332
- Concrete	m^3	40	460,000	18,400	610,000	24,400
- Foundation treatment	LS	-	-	2,052	-	2,673
- Steel bar	ton	450	1,600	720	1,600	720
- Miscellaneous	LS	-	-	1,165	-	1,506
Sub-total				24,457		31,631
Total				31,098		38,591
II METALWORKS						
- Diversion gate	ton	4,000	70	280	80	320
- Spillway gate	ton	5,200	1,000	5,200	1,000	5,200
- River outlet facilities	LS	-	-	1,000	-	400
Total				6,480		5,920

Table P 11 BREAKDOWN OF CONSTRUCTION COST OF INJE MULTIPURPOSE DAM FOR SAMPLE DESIGN

(1978 price level)

Dam	Unit	Unit Price ($)	Inje Quantity	Inje Amount ($ 10^3)
I CIVIL WORKS				
1. Preparatory Works				
- Access road	km	100,000	3.52	352
- Construction facilities	LS	-	-	5,049
Sub-total				5,401
2. Diversion Tunnel				
- Tunnel excavation	m^3	25	46,800	1,170
- Lining concrete	m^3	60	11,800	708
- Steel bar	ton	500	1,180	590
- Miscellaneous	LS	-	-	987
Sub-total				3,455
3. Dam & Spillway				
- Excavation	m^3	4.0	553,000	2,212
- Concrete	m^3	40	1,668,000	66,720
- Foundation treatment	LS	-	-	6,893
- Steel bar	ton	450	2,268,000	1,021
- Miscellaneous	LS	-	-	3,842
Sub-total				80,688
Total				89,544
II METALWORKS				
- Diversion gate	ton	4,000	150	600
- Spillway gate	ton	5,200	1,160	6,032
- River outlet facilities	LS	-	-	850
Total				7,482

Table P 11 Continued (2)

Power Facilities	Unit	Unit Price ($)	Inje Quantity	Inje Amount ($ 10^3)
I CIVIL WORKS				
1. Preparatory Works				
- Access road	km	100,000	9.5	950
- Construction facilities	LS	-	-	2,066
Sub-total				3,016
2. Intake				
- Excavation	m^3	4.0	62,624	250
- Concrete	m^3	45	26,956	1,213
- Steel bar	ton	450	809	364
- Miscellaneous	LS	-	-	183
Sub-total				2,010
3. Headrace Tunnel				
- Tunnel excavation	m^3	30	304,900	9,147
- Lining concrete	m^3	74	100,900	7,467
- Steel bar	ton	500	4,040	2,020
- Miscellaneous	LS	-	-	3,726
Sub-total				22,360
4. Surge Tank				
- Shaft excavation	m^3	25	60,935	1,523
- Concrete	m^3	60	13,063	784
- Steel bar	ton	450	784	353
- Miscellaneous	LS	-	-	532
Sub-total				3,192
5. Penstock				
- Tunnel excavation	m^3	30	7,100	213
- Lining & backfill concrete	m^3	65	2,100	137
- Open excavation	m^3	4.0	67,300	269
- Concrete, block etc.	m^3	50	22,100	1,105
- Steel bar	ton	450	304	137
- Miscellaneous	LS	-	-	465
Sub-total				2,326

Table P 11 Continued (3)

Power Facilities	Unit	Unit Price ($)	Inje Quantity	Inje Amount ($ 10^3)
I CIVIL WORKS (Continued)				
6. Power House, Substructure				
- Excavation	m^3	2.5	316,000	790
- Concrete	m^3	55	30,000	1,650
- Steel bar	ton	450	1,500	675
- Miscellaneous	LS	-	-	467
Sub-total				3,582
7. Power House				
- Superstructure	space volume m^3	55	14,100	776
8. Tailrace				
- Excavation	m^3	2.5	13,400	34
- Concrete	m^3	45	2,100	95
- Steel bar	ton	450	106	48
- Miscellaneous	LS	-	-	9
Sub-total				186
Total				37,448
II METALWORKS				
- Intake trashrack	ton	2,000	89	178
- Intake gate	ton	5,500	124	682
- Steel penstock	ton	2,000	2,830	5,660
- Tailrace gate	ton	4,500	56	252
Total				6,772

Table P 12 BREAKDOWN OF CONSTRUCTION COST OF GUJEOL MULTIPURPOSE DAM FOR SAMPLE DESIGN

(1978 price level)

Dam	Unit	Unit Price ($)	Gujeol Quantity	Gujeol Amount ($ 10^3)
I CIVIL WORKS				
1. Preparatory Works				
- Access road	km	100,000	1.93	193
- Construction facilities	LS	-	-	837
Sub-total				1,030
2. Diversion Tunnel				
- Tunnel excavation	m^3	25	30,400	760
- Lining concrete	m^3	60	7,700	462
- Steel bar	ton	500	770	385
- Miscellaneous	LS	-	-	482
Sub-total				2,089
3. Dam				
- Excavation	m^3	3.0	95,400	286
- Embankment	m^3	7.0	1,107,000	7,749
- Foundation treatment	LS	-	-	804
- Miscellaneous	LS	-	-	442
Sub-total				9,281
4. Spillway				
- Excavation	m^3	4.0	364,000	1,456
- Concrete	m^3	45	17,200	774
- Steel bar	ton	450	520	235
- Miscellaneous	LS	-	-	123
Sub-total				2,588
Total				14,988
II METALWORKS				
- Diversion gate	ton	4,000	150	600
- Spillway gate	ton	5,200	130	676
- River outlet facilities	LS	-	-	130
Total				1,406

Table P 12 Continued (2)

Power Facilities	Unit	Unit Price ($)	Gujeol Diversion Plan Quantity	Gujeol Diversion Plan Amount ($ 10^3)	Gujeol Songcheon Plan Quantity	Gujeol Songcheon Plan Amount ($ 10^3)
I CIVIL WORKS						
1. Preparatory Works						
- Access road	km	-	0	0	0	0
- Construction facilities	LS	-	-	761	-	976
Sub-total				761		976
2. Intake						
- Excavation	m^3	4.0	20,670	83	17,900	72
- Concrete	m^3	45	1,770	80	2,000	90
- Steel bar	ton	450	53	24	61	27
- Miscellaneous	LS	-	0	19	-	19
Sub-total				206		208
3. Headrace Tunnel						
- Tunnel excavation	m^3	30	63,340	1,900	111,100	3,333
- Lining concrete	m^3	74	25,510	1,888	44,800	3,315
- Steel bar	ton	500	1,021	511	1,790	895
- Miscellaneous	LS	-	-	860	-	1,509
Sub-total				5,159		9,052
4. Surge Tank						
- Shaft excavation	m^3	25	6,100	153	8,800	220
- Concrete	m^3	60	670	40	740	44
- Steel bar	ton	450	40	18	44	20
- Miscellaneous	LS	-	-	42	-	57
Sub-total				253		341
5. Penstock						
- Tunnel excavation	m^3	30	400	12	560	17
- Lining & backfill concrete	m^3	65	160	10	230	15
- Open excavation	m^3	4.0	172,270	689	50,280	201
- Concrete, block etc.	m^3	50	75,680	3,784	22,080	1,104
- Steel bar	ton	450	763	343	230	104
- Miscellaneous	LS	-	-	1,210	-	34
Sub-total				6,048		1,475

Table P 12 Continued (3)

Power Facilities	Unit	Unit Price ($)	Gujeol Diversion Plan Quantity	Gujeol Diversion Plan Amount ($ 10^3)	Gujeol Songcheon Plan Quantity	Gujeol Songcheon Plan Amount ($ 10^3)
I CIVIL WORKS (Continued)						
6. Power House, Substructure						
- Excavation	m^3	2.5	102,000	255	195,000	488
- Concrete	m^3	55	6,000	330	30,000	1,650
- Steel bar	ton	450	30	14	1,500	675
- Miscellaneous	LS	-	-	90	-	422
Sub-total				689		3,235
7. Power House						
- Superstructure	space volume m^3	55	4,620	254	3,700	204
8. Tailrace						
- Excavation	m^3	2.5	3,840	10	13,400	34
- Concrete	m^3	45	840	38	1,400	63
- Steel bar	ton	450	42	19	72	32
- Miscellaneous	LS	-	-	3	-	7
Sub-total				70		136
9. Reregulating Dam						
- Excavation	m^3	3.0	-	-	25,100	75
- Concrete	m^3	45	-	-	20,700	932
- Bypass, foundation treatment & miscellaneous	LS	-	-	-	-	604
Sub-total						1,611
Total				13,440		17,238
II METALWORKS						
- Intake trashrack	ton	2,000	15	30	18	36
- Intake gate	ton	5,500	10	55	10	55
- Steel penstock	ton	2,000	8,407	16,814	1,340	2,680
- Tailrace gate	ton	4,500	8	36	8	36
- Reregulating dam's gate	ton	4,500	-	-	2	9
Total				16,935		2,816

Table P 13 BREAKDOWN OF CONSTRUCTION COST OF BONGHWA MULTIPURPOSE DAM FOR SAMPLE DESIGN

(1978 price level)

Dam	Unit	Unit Price ($)	Bonghwa Quantity	Bonghwa Amount ($ 10^3)
I CIVIL WORKS				
1. Preparatory Works				
- Access road	km	100,000	14	1,400
- Construction facilities	LS	-	-	5,222
Sub-total				6,222
2. Diversion Tunnel				
- Tunnel excavation	m^3	25	48,000	1,200
- Lining concrete	m^3	60	16,000	960
- Steel bar	ton	500	1,600	800
- Miscellaneous	LS	-	-	1,184
Sub-total				4,144
3. Dam & Spillway				
- Excavation	m^3	4.0	587,000	2,348
- Concrete	m^3	40	1,723,000	68,920
- Foundation treatment	LS	-	-	7,127
- Steel bar	ton	450	1,200	540
- Miscellaneous	LS	-	-	3,947
Sub-total				82,882
Total				93,648
II METALWORKS				
- Diversion gate	ton	4,000	130	520
- Spillway gate	ton	5,200	1,040	5,408
- River outlet facilities	LS	-	-	1,070
Total				6,998

Table P 13 Continued (2)

Power Facilities	Unit	Unit Price ($)	Bonghwa Quantity	Bonghwa Amount ($ 10^3)
I CIVIL WORKS				
1. Preparatory Works				
- Access road	km	-	-	-
- Construction facilities	LS	-	-	786
Sub-total				786
2. Intake				
- Excavation	m^3	4.0	186,000	744
- Concrete	m^3	45	16,100	725
- Steel bar	ton	450	966	435
- Miscellaneous	LS	-	-	191
Sub-total				2,095
3. Headrace Tunnel				
- Tunnel excavation	m^3	30	69,600	2,088
- Lining concrete	m^3	74	22,900	1,695
- Steel bar	ton	500	920	460
- Miscellaneous	LS	-	-	848
Sub-total				5,091
4. Surge Tank				
- Shaft excavation	m^3	25	22,700	568
- Concrete	m^3	60	6,400	384
- Steel bar	ton	450	384	173
- Miscellaneous	LS	-	-	225
Sub-total				1,350
5. Penstock				
- Tunnel excavation	m^3	30	5,000	150
- Lining & backfill concrete	m^3	65	2,100	137
- Open excavation	m^3	4.0	245,600	983
- Concrete, block etc.	m^3	50	3,800	190
- Steel bar	ton	450	177	80
- Miscellaneous	LS	-	-	385
Sub-total				1,925

Table P 13 Continued (3)

Power Facilities	Unit	Unit Price ($)	Bonghwa Quantity	Bonghwa Amount ($ 10^3)
I CIVIL WORKS (Continued)				
6. Power House, Substructure				
- Excavation	m^3	2.5	37,400	94
- Concrete	m^3	44	14,400	792
- Steel bar	ton	450	720	324
- Miscellaneous	LS	-	-	182
Sub-total				1,392
7. Power House				
- Superstructure	space volume m^3	55	19,800	1,089
8. Tailrace				
- Excavation	m^3	2.5	6,100	16
- Concrete	m^3	45	2,000	90
- Steel bar	ton	450	100	45
- Miscellaneous	LS	-	-	8
Sub-total				159
Total				13,887
II METALWORKS				
- Intake trashrack	ton	2,000	64	128
- Intake gate	ton	5,500	89	490
- Steel penstock	ton	2,000	1,050	2,100
- Tailrace gate	ton	4,500	53	239
Sub-total				2,957