H. ENVIRONMENT

H-1. Meteorology in Kandal Province

Table H-1-1 Maximum and minimum of temperature (1996 - 2001) : Station : Pochentong

Year	Temp.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
1996	Max	31	31.8	34.7	34.6	32.8	32.8	33.9	32.5	30.8	30.6	30.5	27.6
	Min	20.6	21.8	23.4	25.3	25.3	24.7	23.7	24.9	24.3	27.2	26.3	22
1997	Max	30.8	32.4	34.4	35.3	35.2	35.2	32.3	32.6	32.1	31.5	31.3	32.2
	Min	20.6	23.3	23.6	24.9	25.6	25.3	24.7	24.9	24.5	24.6	24.2	23
1998	Max	33.5	34.9	37.1	36.8	33.6	33.1	33.4	32.3	31.9	31.4	30.1	29
	Min	22.7	23.8	24.9	26	25.6	25.3	24.7	24.9	24.5	24.6	24.2	23
1999	Max	31.5	32.8	35.8	33.9	33.1	32.6	32.1	32.5	32.6	30.9	30.1	27.2
	Min	21.9	22.4	24.7	25	24.9	24.5	24.7	24.4	24.5	24.2	23.8	20.8
2000	Max	31.8	32.7	34.1	34.2	34	32.9	32.3	32.1	32	30.4	30.1	30.1
	Min	22.7	22.8	24.3	25.2	25.4	24.7	24.2	24.8	24.5	23.7	23.4	23.4
2001	Max	31.1	32.6	33.4	35.4	34.5	33.4	33.3	32.3	32.5	31.5	29.3	30.7
	Min	23.1	22.6	24.2	25.6	25.7	24.9	24.9	24.4	23.9	23.8	21.8	22

Source: Department of Hydrology, Ministry of Agriculture, Forestry and Fishery

Table H-1-2 Rain fall record in Kandal Province

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual
1984	0.4	16.2	0	99.6	97.5	160.1	117.6	103.6	227.8	132.4	88.8	1.5	1045.5
1985	-	1	0.6	154.7	148.6	65.8	118.9	105.7	341.6	179.7	103.9	4.7	1225.2
1986	-	1.3	0	41.7	219.8	137.5	161.2	299.9	234.7	228.6	77.3	57.4	1459.4
1987	-	0	0	0	69.9	111.7	131.1	144.1	146.1	159.3	281	-	1043.2
1988	-	2.5	56	127	143	316.3	174.7	104.3	227.1	171.9	52.7	-	1375.5
1989	29.2	-	152.5	19.2	148.4	37.2	87.9	156.6	425.4	333.3	118	0	1507.7
1990	-	-	0	31	41	103.3	178.2	228.2	243.7	166.5	39.8	0	1031.7
1991	-	-	-	43.5	82.2	192.8	139.9	184.2	243.7	158.2	3	0	1047.5
1992	-	-	-	0	142.1	107.9	199.2	114.7	146.2	116.7	-	0	826.8
1993	6.4	-	127.3	109.5	94.7	200.2	191	105.8	134.6	370.2	95.8	-	1435.5
1994	-	-	147.2	0.9	140.2	54.8	177.2	229.7	559.1	210.2	0	0	1519.3
1995	-	-	-	30.4	115.7	292.5	115.4	116.7	193.8	481.4	4.7	-	1350.6
1996	-	-	0	109.3	280.2	90	108.7	174.2	228.5	240.1	202.9	1.8	1435.7
1997	-	1.2	-	32	106.5	96.1	190.4	102.6	125.4	430.3	26.6	5.2	1116.3
1998	-	-	-	76.5	68	151.1	144.2	171.2	206.1	158.8	216.9	19.8	1212.6
1999	0	2.5	13	218.3	161.5	79.2	156.9	224.9	168.5	362.4	204.5	39.1	1630.8
2000	34.3	26.1	64.7	111.4	133.9	212	151.3	155.4	96.6	395.8	103.5	274.2	1759.2
2001	67.2	0	83.4	45.5	87.7	123.4	116	181.7	231.7	375.3	56.9	3.3	1372.1

Source: Department of Hydrology, Ministry of Agriculture, Forestry and Fishery

H-2. Household and Population in Kandal Province

Table H-2 Household and Population of the Study Area along NR-1

Name of District, Commune and Villages	Total No of household	Population		
		Total	Male	Female
Mean Chey District	27443	157,112	74,500	82,612
Chbar AmpovI Commune	1754	10,378	4,980	5398
Phum Prek		3,084	1,452	1,632
Phum Doeum Mak Chleu		4,207	2,045	2,162
Phum Doeum Ampil		3, 045	1,442	1,603
Kien Svay District	28,535	148,358	70,930	77,428
Veal Sbov Commune	1,368	6,952	3,389	3,563
Kdei Ta Koy		2,046	953	1,093
Veal Sbov		1,392	692	700
Svay To Ok		1,806	908	898
Preaek Cheang Prum		1,708	836	872
Prek Aeng commune	2,509	12,960	6,229	6,731
Kbal Chroy		1,071	483	588
Ta Prum		2,351	1,094	1,257
Mitapheap		2,252	1,099	1,153
Toul To Chan		1,273	605	668
Kbal Kaoh Commune	2,822	14,903	7,167	7,736
Chroy Anpil		7,187	3,482	3,705
Yok Bat		3,356	1,562	1,794
Preak Thum		4,360	2,123	2,237
Phum Thum Commune	1,818	9,491	4,517	4,974
Phum Thum		2,139	997	1,142
Kaki Commune	2,893	15,485	7,511	7,974
Toul Thnot		4,599	2,169	2,430
Slab Ta Aon		3,077	1,482	1,595
Dei Edth Commune	2,857	15,712	7,545	8,167
Popeal Khae		3,057	1,440	1,617
Dei Edth Kaoh Plaos		4,254	2,51	2,203
Sdau Kanleang		8,401	4,054	4,347
Bantheay Daek Commune	2,344	12,353	5,839	6,514
Khsom		4,380	2,074	2,306
Kandal Leu		4,085	1,932	2,153
Kandal Kraom		3,888	1,833	2,055
Samraong Thum Commune	3,749	18,655	8,909	9,746
Chey Otdam		3,377	1,629	1,748
Prek Ta Kaev		3,610	1,708	1,902
Chroy Dang		2,916	1,375	1,541
Stueng		2,294	1,091	1,203
Preak Traeng		2,772	1,347	1,425
Samraong K'aer		3,686	1,759	1,927
Kaki Thum Commune	2,294	11,518	5,376	6,142
Pou Miev		1,778	816	962
Kaki Thum		2,884	1,373	1,511
Reang Dek		3,735	1,748	1,987
Leuk Daek District	9,811	52,976	25,487	27,489
Kampomg Phnum Commune	2,306	12,235	5,799	6,436
Kbal Chroy		3,092	1,472	1,620
Kampong Pou		3,436	1,656	1,780
Ampil Tuek		4,039	1,885	2,154
Preak Tonloab Commune	2,455	13,277	6,349	6,928
Kampong Chamlong		4,966	2,394	2,572
Spean Daek		3,406	1,548	1,858

H-3. Details of Affected Area

Table H-3-1(1/4) Affected houses and structures (15m from the road center on both side: Temporally ROW)

Station (Km)		Left / Right side	Affected House / Building Type								Affected Fence Type					
			Leave roof		Zinc plate roof		Tile roof		Concrete		Concrete		Wooden		Barbed wire	
			No.	m^2	No.	m^2	No.	m^2	No.	m^2	No.	m	No.	m	No.	m
0	0+000 to 0+500	Left	0	0.0	8	176.0	3	39.6	0	102.4	1	31	0	0	0	0
		Right	0	0.0	8	172.4	1	19.9	0	0.0	1	11	0	0	0	0
	0+500 to 1+000	Left	0	0.0	27	1,130.3	4	197.2	13	387.2	2	32	0	0	0	0
		Right	0	0.0	28	834.6	0	0.0	1	42.0	1	17	0	0	0	0
1	1+000 to 1+500	Left	0	0.0	33	1,122.0	4	149.0	9	246.8	0	0	0	0	0	0
		Right	0	0.0	13	469.9	1	26.2	0	0.0	0	0	0	0	1	115
	1+500 to 2+000	Left	0	0.0	27	750.1	3	91.6	1	36.3	0	0	1	21	0	0
		Right	1	56.1	17	642.6	0	0.0	0	0.0	1	30	0	0	1	32
2	2+000 to 2+500	Left	0	0.0	18	333.8	0	0.0	0	0.0	0	0	0	0	0	0
		Right	2	25.0	11	205.0	3	29.2	0	0.0	1	21	0	0	3	205
	2+500 to 3+000	Left	0	0.0	4	101.4	0	0.0	0	0.0	1	40	1	30	0	0
		Right	0	0.0	15	349.9	0	0.0	0	0.0	0	0	0	0	2	60
3	3+000 to 3+500	Left	0	0.0	8	235.0	0	0.0	1	12.2	0	0	0	0	0	0
		Right	0	0.0	7	188.4	1	30.1	0	0.0	1	30	0	0	2	122
	3+500 to 4+000	Left	0	0.0	9	102.3	3	37.6	0	0.0	0	0	0	0	1	25
		Right	0	0.0	15	432.8	0	0.0	1	9.4	0	0	0	0	0	0
4	4+000 to 4+500	Left	0	0.0	14	174.1	3	24.3	0	0.0	0	0	0	0	1	10
		Right	0	0.0	17	523.5	0	0.0	0	0.0	2	56	0	0	0	0
	4+500 to 5+000	Left	0	0.0	3	23.1	6	60.6	0	0.0	0	0	0	0	0	0
		Right	0	0.0	16	443.2	2	31.1	0	0.0	0	0	0	0	0	0
5	5+000 to 5+500	Left	0	0.0	10	212.2	1	11.0	0	0.0	1	35	0	0	0	0
		Right	1	91.6	8	235.4	0	0.0	0	0.0	5	158	0	0	1	18
	5+500 to 6+000	Left	0	0.0	10	404.8	3	140.3	7	269.2	0	0	0	0	0	0
		Right	0	0.0	18	924.8	3	184.9	0	0.0	5	140	0	0	0	0
6	6+000 to 6+500	Left	1	104.8	6	164.0	1	61.5	0	0.0	1	6	0	0	0	0
		Right	0	0.0	12	441.5	0	0.0	0	0.0	2	37	0	0	1	42
	6+500 to 7+000	Left	0	0.0	1	26.2	3	159.1	2	35.3	1	40	0	0	0	0
		Right	0	0.0	9	349.9	0	0.0	1	69.5	1	38	0	0	2	100
7	7+000 to 7+500	Left	0	0.0	5	116.9	0	0.0	0	0.0	0	0	0	0	0	0
		Right	1	12.8	2	31.7	0	0.0	1	65.9	3	125	0	0	2	192
	7+500 to 8+000	Left	0	0.0	1	60.3	1	7.8	0	0.0	3	113	0	0	0	0
		Right	0	0.0	2	73.7	2	119.3	0	0.0	0	0	0	0	4	212
8	8+000 to 8+500	Left	0	0.0	2	119.0	2	38.2	1	17.7	3	163	0	0	0	0
		Right	0	0.0	2	44.9	0	0.0	0	0.0	0	0	0	0	1	40
	8+500 to 9+000	Left	0	0.0	6	125.7	5	130.0	0	0.0	0	0	0	0	0	0
		Right	0	0.0	6	251.4	0	0.0	0	0.0	0	0	0	0	2	78
9	9+000 to 9+500	Left	0	0.0	6	421.0	1	15.2	1	21.4	0	0	0	0	0	0
		Right	0	0.0	8	259.1	0	0.0	0	0.0	1	3	0	0	2	61
	9+500 to 10+000	Left	0	0.0	6	149.5	3	63.4	0	0.0	0	0	1	32	0	0
		Right	0	0.0	4	99.7	0	0.0	0	0.0	4	102	0	0	3	86
10	10+000 to 10+500	Left	0	0.0	12	381.0	5	149.4	2	166.0	0	0	0	0	0	0
		Right	0	0.0	13	391.1	3	142.9	0	0.0	0	0	0	0	2	81
	10+500 to 11+000	Left	0	0.0	5	146.0	2	59.4	0	0.0	1	22	0	0	0	0
		Right	0	0.0	15	487.5	1	26.4	1	21.2	0	0	1	3	0	0
11	11+000 to 11+500	Left	0	0.0	4	95.9	4	53.1	0	0.0	1	25	0	0	0	0
		Right	1	34.8	12	384.0	2	75.0	0	0.0	5	157	0	0	0	0
	11+500 to 12+000	Left	0	0.0	2	126.0	1	8.5	0	0.0	1	105	0	0	0	0
		Right	0	0.0	7	111.4	0	0.0	0	0.0	1	60	0	0	1	30
12	12+000 to 12+500	Left	0	0.0	6	108.1	1	27.4	0	0.0	2	130	0	0	0	0
		Right	0	0.0	7	163.7	1	20.4	0	0.0	1	31	0	0	2	67
	12+500 to 13+000	Left	0	0.0	7	110.9	5	38.9	0	0.0	0	0	0	0	0	0
		Right	0	0.0	11	319.2	0	0.0	0	0.0	0	0	0	0	0	0
13	13+000 to 13+500	Left	0	0.0	9	146.2	3	64.3	4	72.5	3	45	0	0	0	0
		Right	0	0.0	9	325.3	3	86.8	2	62.7	3	100	1	20	0	0
	13+500 to 14+000	Left	0	0.0	5	160.8	1	33.2	8	780.4	5	120	0	0	0	0
		Right	0	0.0	0	0.0	1	33.0	8	564.3	2	98	0	0	0	0
14	14+000 to 14+500	Left	0	0.0	3	77.4	1	11.8	2	46.9	5	205	0	0	0	0
		Right	0	0.0	5	153.0	0	0.0	0	0.0	10	456	1	35	0	0
	14+500 to 15+000	Left	0	0.0	2	17.7	0	0.0	0	0.0	2	72	0	0	0	0
		Right	1	16.7	6	134.6	0	0.0	0	0.0	4	86	1	21	1	48
Sub total			8	341.8	562	16,761.4	93	2,497.3	66	3,029.1	87	2,940	7	162	35	1,624

Table H-3-1(2/4) Affected houses and structures (15m from the road center on both side: Temporally ROW)

Station (Km)		Left / Right side	Affected House / Building Type								Affected Fence Type					
			Leave roof		Zinc plate roof		Tile roof		Concrete		Concrete		Wooden		Barbed wire	
			No.	m^2	No.	m^2	No.	m^2	No.	m^2	No.	m	No.	m	No.	m
15	15+000 to15+500	Left	0	0.0	4	47.6	1	15.2	0	0.0	1	41	0	0	0	0
		Right	0	0.0	3	73.7	0	0.0	0	0.0	3	160	0	0	1	34
	15+500 to 16+000	Left	0	0.0	7	102.1	2	50.0	0	0.0	2	37	0	0	0	0
		Right	0	0.0	1	20.1	0	0.0	1	8.1	4	144	0	0	0	0
16	16+000 to 16+500	Left	0	0.0	4	81.8	0	0.0	0	0.0	1	6	0	0	0	0
		Right	0	0.0	7	145.8	0	0.0	0	0.0	3	91	0	0	0	0
	16+500 to 17+000	Left	0	0.0	8	153.5	0	0.0	1	24.5	3	80	0	0	0	0
		Right	0	0.0	6	137.9	1	33.1	0	0.0	0	0	2	60	1	6
17	17+000 to 17+500	Left	0	0.0	9	168.7	0	0.0	0	0.0	2	38	0	0	0	0
		Right	0	0.0	13	347.0	0	0.0	0	0.0	3	36	0	0	2	39
	17+500 to 18+000	Left	0	0.0	22	484.9	1	10.8	1	21.3	1	23	0	0	0	0
		Right	0	0.0	2	59.6	1	66.5	0	0.0	3	341	0	0	0	0
18	18+000 to 18+500	Left	0	0.0	3	64.8	0	0.0	0	0.0	1	15	0	0	0	0
		Right	0	0.0	4	78.5	0	0.0	0	0.0	2	43	0	0	0	0
	18+500 to 19+000	Left	0	0.0	6	96.5	2	44.0	0	0.0	1	7	0	0	0	0
		Right	0	0.0	3	86.2	0	0.0	0	0.0	1	20	0	0	0	0
19	19+000 to 19+500	Left	0	0.0	16	433.1	3	94.8	0	0.0	0	0	0	0	0	0
		Right	0	0.0	5	145.6	0	0.0	0	0.0	1	35	0	0	0	0
	19+500 to 20+000	Left	1	35.6	8	193.7	0	0.0	0	0.0	2	38	0	0	0	0
		Right	3	29.9	21	411.8	0	0.0	0	0.0	0	0	0	0	1	25
20	20+000 to 20+500	Left	0	0.0	6	116.2	0	0.0	0	0.0	0	0	0	0	0	0
		Right	4	85.2	15	396.6	1	23.1	0	0.0	0	0	0	0	0	0
	20+500 to 21+000	Left	1	16.9	4	79.6	1	14.7	0	0.0	0	0	0	0	0	0
		Right	0	0.0	19	439.6	0	0.0	0	0.0	0	0	0	0	0	0
21	21+000 to 21+500	Left	0	0.0	13	294.0	1	13.5	2	70.1	1	6	0	0	0	0
		Right	0	0.0	14	330.7	1	17.6	0	0.0	0	0	0	0	0	0
	21+500 to 22+000	Left	0	0.0	2	39.3	0	0.0	0	0.0	1	235	0	0	0	0
		Right	1	23.1	4	68.0	0	0.0	0	0.0	0	0	1	40	0	0
22	22+000 to 22+500	Left	0	0.0	3	77.8	1	5.2	0	0.0	0	0	0	0	0	0
		Right	0	0.0	8	179.4	0	0.0	0	0.0	0	0	0	0	0	0
	22+500 to 23+000	Left	0	0.0	3	58.1	0	0.0	0	0.0	0	0	0	0	0	0
		Right	0	0.0	25	514.8	0	0.0	0	0.0	0	0	0	0	0	0
23	23+000 to 23+500	Left	0	0.0	0	0.0	0	0.0	0	0.0	0	0	0	0	0	0
		Right	0	0.0	19	441.9	0	0.0	0	0.0	0	0	0	0	0	0
	23+500 to 24+000	Left	0	0.0	4	67.4	0	0.0	0	0.0	0	0	0	0	0	0
		Right	0	0.0	12	371.3	0	0.0	0	0.0	1	24	0	0	0	0
24	24+000 to 24+500	Left	0	0.0	7	121.9	0	0.0	0	0.0	0	0	0	0	0	0
		Right	1	11.6	6	118.6	0	0.0	0	0.0	1	55	0	0	0	0
	24+500 to 25+000	Left	0	0.0	3	37.2	0	0.0	0	0.0	0	0	0	0	0	0
		Right	2	44.8	2	18.1	0	0.0	0	0.0	0	0	1	16	0	0
25	25+000 to 25+500	Left	0	0.0	4	92.3	4	73.5	0	0.0	0	0	0	0	0	0
		Right	1	15.0	6	127.2	0	0.0	0	0.0	0	0	0	0	0	0
	25+500 to 26+000	Left	0	0.0	5	74.9	0	0.0	0	0.0	0	0	0	0	0	0
		Right	0	0.0	10	293.6	0	0.0	0	0.0	2	56	0	0	0	0
26	26+000 to 26+500	Left	2	29.2	7	109.2	0	0.0	0	0.0	0	0	0	0	0	0
		Right	1	15.4	3	61.1	0	0.0	0	0.0	0	0	0	0	0	0
	26+500 to 27+000	Left	1	10.7	3	23.4	0	0.0	0	0.0	0	0	0	0	0	0
		Right	0	0.0	2	31.6	0	0.0	0	0.0	1	54	0	0	0	0
27	27+000 to 27+500	Left	3	68.2	2	29.9	1	21.8	0	0.0	0	0	0	0	0	0
		Right	5	65.8	6	130.0	0	0.0	0	0.0	0	0	0	0	0	0
	27+500 to 28+000	Left	3	43.6	3	52.6	1	5.6	0	0.0	0	0	0	0	0	0
		Right	1	11.5	8	154.0	0	0.0	0	0.0	1	27	0	0	0	0
28	28+000 to28+500	Left	0	0.0	6	104.9	0	0.0	1	61.3	0	0	0	0	0	0
		Right	0	0.0	6	97.8	0	0.0	0	0.0	1	30	0	0	0	0
	28+500 to 29+000	Left	0	0.0	2	38.1	0	0.0	0	0.0	0	0	0	0	0	0
		Right	0	0.0	3	46.9	0	0.0	0	0.0	0	0	0	0	0	0
29	29+000 to 29+500	Left	0	0.0	5	95.7	0	0.0	0	0.0	0	0	0	0	0	0
		Right	0	0.0	1	22.3	1	18.0	0	0.0	0	0	0	0	0	0
	29+500 to 30+000	Left	0	0.0	1	23.5	1	20.0	0	0.0	0	0	0	0	0	0
		Right	0	0.0	2	32.1	2	19.9	0	0.0	0	0	0	0	0	0
Sub-total			30	506.4	406	8,744.1	26	547.2	6	185.2	43	1,642	4	116	5	104

Table H-3-1(3/4) Affected houses and structures (15m from the road center on both side: Temporally ROW)

Station (Km)		Left / Right side	Affected House / Building Type								Affected Fence Type					
			Leave roof		Zinc plate roof		Tile roof		Concrete		Concrete		Wooden		Barbed wire	
			No.	m^2		m^2		m^2		m^2		m		m		m
30	30+000 to 30+500	Left	0	0.0	1	14.0	0	0.0	0	0.0	0	0	0	0	0	0
		Right	0	0.0	0	0.0	0	0.0	0	0.0	0	0	0	0	0	0
	30+500 to 31+000	Left	1	12.9	7	123.5	0	0.0	0	0.0	0	0	0	0	0	0
		Right	2	11.4	13	278.8	0	0.0	0	0.0	0	0	0	0	0	0
31	31+000 to 31+500	Left	0	0.0	3	49.1	0	0.0	0	0.0	0	0	0	0	0	0
		Right	2	17.9	12	236.5	1	16.3	0	0.0	0	0	0	0	0	0
	31+500 to 32+000	Left	0	0.0	1	37.8	0	0.0	0	0.0	0	0	0	0	0	0
		Right	8	80.2	10	200.2	0	0.0	0	0.0	0	0	0	0	0	0
32	32+000 to 32+500	Left	0	0.0	1	15.0	1	3.7	0	0.0	0	0	0	0	0	0
		Right	1	30.6	5	48.9	0	0.0	0	0.0	0	0	0	0	0	0
	32+500 to 33+000	Left	0	0.0	2	46.1	1	4.0	0	0.0	0	0	0	0	0	0
		Right	12	234.2	3	59.8	1	47.8	0	0.0	0	0	0	0	0	0
33	33+000 to 33+500	Left	0	0.0	3	50.2	1	8.0	0	0.0	0	0	0	0	0	0
		Right	3	32.5	5	108.5	0	0.0	0	0.0	0	0	0	0	0	0
	33+500 to 34+000	Left	0	0.0		143.7	0	0.0	0	0.0	0	0	0	0	0	0
		Right	1	11.2	5	119.8	0	0.0	0	0.0	0	0	0	0	0	0
34	34+000 to 34+500	Left	1	8.4	13	265.9	1	24.1	0	0.0	0	0	0	0	0	0
		Right	2	31.1	8	175.4	0	0.0	0	0.0	0	0	0	0	0	0
	34+500 to 35+000	Left	0	0.0	8	210.3	0	0.0	0	0.0	0	0	0	0	0	0
		Right	0	0.0	7	139.5	2	92.1	0	0.0	0	0	0	0	0	0
35	35+000 to 35+500	Left	0	0.0	18	427.7	1	33.2	0	0.0	0	0	0	0	0	0
		Right	0	0.0	4	80.1	2	29.0	0	0.0	2	38	0	0	0	0
	35+500 to 36+000	Left	0	0.0	19	518.5	3	108.4	3	42.4	0	0	0	0	0	0
		Right	0	0.0	21	558.1	3	66.0	0	0.0	0	0	0	0	0	0
36	36+000 to 36+500	Left	1	13.6	0	0.0	0	0.0	0	0.0	0	0	0	0	0	0
		Right	0	0.0	4	70.7	0	0.0	0	0.0	0	0	0	0	0	0
	36+500 to 37+000	Left	0	0.0	0	0.0	0	0.0	0	0.0	0	0	0	0	0	0
		Right	0	0.0	5	87.1	0	0.0	0	0.0	0	0	0	0	0	0
37	37+000 to 37+500	Left	0	0.0	3	49.1	0	0.0	0	0.0	0	0	0	0	0	0
		Right	2	26.1	11	149.5	0	0.0	0	0.0	0	0	0	0	0	0
	37+500 to 38+000	Left	0	0.0	0	0.0	0	0.0	0	0.0	0	0	0	0	0	0
		Right	2	30.5	7	146.9	0	0.0	0	0.0	0	0	0	0	0	0
38	38+000 to 38+500	Left	1	22.5	5	83.2	2	23.8	0	0.0	0	0	0	0	0	0
		Right	0	0.0	3	46.0	0	0.0	0	0.0	0	0	0	0	0	0
	38+500 to 39+000	Left	1	7.7	5	35.7	0	0.0	0	0.0	0	0	0	0	0	0
		Right	1	12.2	11	160.2	0	0.0	0	0.0	0	0	0	0	0	0
39	39+000 to 39+500	Left	0	0.0	1	3.0	0	0.0	0	0.0	0	0	0	0	0	0
		Right	0	0.0	6	107.0	0	0.0	0	0.0	0	0	0	0	0	0
	39+500 to 40+000	Left	0	0.0	4	40.6	1	4.4	0	0.0	0	0	0	0	0	0
		Right	2	22.9	11	203.0	1	15.9	0	0.0	1	36	0	0	0	0
40	40+000 to 40+500	Left	0	0.0	2	22.0	0	0.0	0	0.0	0	0	0	0	0	0
		Right	0	0.0	9	176.6	0	0.0	0	0.0	0	0	0	0	0	0
	40+500 to 41+000	Left	1	19.6	3	38.8	1	65.7	0	0.0	0	0	0	0	0	0
		Right	2	33.4	15	267.7	0	0.0	0	0.0	0	0	0	0	0	0
41	41+000 to 41+500	Left	0	0.0	3	60.6	0	0.0	0	0.0	0	0	0	0	0	0
		Right	0	0.0	15	330.8	0	0.0	0	0.0	0	0	0	0	0	0
	41+500 to 42+000	Left	0	0.0	0	0.0	0	0.0	0	0.0	0	0	0	0	0	0
		Right	0	0.0	0	0.0	0	0.0	0	0.0	0	0	0	0	0	0
42	42+000 to 42+500	Left	0	0.0	0	0.0	1	15.6	0	0.0	0	0	0	0	0	0
		Right	0	0.0	1	15.0	0	0.0	0	0.0	0	0	0	0	0	0
	42+500 to 43+000	Left	0	0.0	0	0.0	0	0.0	0	0.0	0	0	0	0	0	0
		Right	0	0.0	0	0.0	0	0.0	0	0.0	0	0	0	0	0	0
43	43+000 to 43+500	Left	1	13.2	3	53.1	0	0.0	0	0.0	0	0	0	0	0	0
		Right	0	0.0	0	0.0	0	0.0	0	0.0	0	0	0	0	0	0
	43+500 to 44+000	Left	0	0.0	0	0.0	0	0.0	0	0.0	0	0	0	0	0	0
		Right	0	0.0	0	0.0	0	0.0	0	0.0	0	0	0	0	0	0
44	44+000 to 44+500	Left	1	26.5	2	87.5	0	0.0	0	0.0	0	0	0	0	0	0
		Right	1	15.1	2	28.8	0	0.0	0	0.0	0	0	0	0	0	0
	44+500 to 45+000	Left	0	0.0	2	40.1	0	0.0	0	0.0	0	0	0	0	0	0
		Right	0	0.0	2	26.3	0	0.0	0	0.0	0	0	0	0	0	0
Sub total			49	713.7	304	6,236.5	23	558.1	3	42.4	3	74	0	0	0	0

Table H-3-1(4/4) Affected houses and structures (15m from the road center on both side: Temporally ROW)

Station (Km)		Left / Right side	Affected House / Building Type								Affected Fence Type					
			Leave roof		Zinc plate roof		Tile roof		Concrete		Concrete		Wooden		Barbed wire	
			No.	m^2		m^2		m^2		m^2		m		m		m
45	45+000 to 45+500	Left	0	0.0	2	56.4	0	0.0	0	0.0	0	0	0	0	0	0
		Right	1	11.1	3	58.7	0	0.0	0	0.0	0	0	0	0	0	0
	45+500 to 46+000	Left	1	17.2	11	488.8	1	33.8	0	0.0	0	0	0	0	0	0
		Right	0	0.0	15	277.0	1	14.1	0	0.0	1	25	0	0	1	22
46	46+000 to 46+500	Left	4	45.5	9	176.0	0	0.0	0	0.0	0	0	0	0	0	0
		Right	0	0.0	11	249.1	0	0.0	0	0.0	0	0	0	0	0	0
	46+500 to 47+000	Left	0	0.0	4	57.6	1	12.8	0	0.0	0	0	0	0	0	0
		Right	4	40.0	8	108.6	0	0.0	0	0.0	0	0	0	0	0	0
47	47+000 to 47+500	Left	0	0.0	3	57.1	0	0.0	0	0.0	0	0	0	0	0	0
		Right	0	0.0	1	27.5	0	0.0	0	0.0	0	0	0	0	0	0
	47+500 to 48+000	Left	0	0.0	4	70.3	0	0.0	0	0.0	0	0	0	0	0	0
		Right	0	0.0	0	0.0	0	0.0	0	0.0	0	0	0	0	0	0
48	48+000 to 48+500	Left	0	0.0	0	0.0	0	0.0	0	0.0	0	0	0	0	0	0
		Right	1	12.0	0	0.0	0	0.0	0	0.0	0	0	0	0	0	0
	48+500 to 49+000	Left	0	0.0	1	15.7	0	0.0	0	0.0	0	0	0	0	0	0
		Right	0	0.0	6	84.9	0	0.0	0	0.0	0	0	0	0	0	0
49	49+000 to 49+500	Left	2	21.2	13	263.9	0	0.0	0	0.0	0	0	0	0	0	0
		Right	4	37.2	6	104.7	1	40.2	0	0.0	0	0	0	0	0	0
	49+500 to 50+000	Left	0	0.0	3	65.3	0	0.0	0	0.0	0	0	0	0	0	0
		Right	2	50.5	4	84.0	0	0.0	0	0.0	0	0	0	0	0	0
50	50+000 to 50+500	Left	0	0.0	1	32.7	0	0.0	0	0.0	0	0	0	0	0	0
		Right	0	0.0	7	134.6	0	0.0	0	0.0	0	0	0	0	0	0
	50+500 to 51+000	Left	1	6.8	5	95.0	0	0.0	0	0.0	0	0	0	0	0	0
		Right	0	0.0	9	219.5	0	0.0	0	0.0	0	0	0	0	0	0
51	51+000 to 51+500	Left	0	0.0	5	84.2	0	0.0	0	0.0	0	0	0	0	0	0
		Right	0	0.0	1	13.1	0	0.0	0	0.0	0	0	0	0	0	0
	51+500 to 52+000	Left	0	0.0	1	5.0	0	0.0	0	0.0	0	0	0	0	0	0
		Right	0	0.0	5	111.0	0	0.0	0	0.0	0	0	0	0	0	0
52	52+000 to 52+500	Left	0	0.0	2	51.0	0	0.0	0	0.0	0	0	0	0	0	0
		Right	1	16.3	1	16.3	0	0.0	0	0.0	0	0	0	0	0	0
	52+500 to 53+000	Left	0	0.0	6	76.9	0	0.0	0	0.0	0	0	0	0	0	0
		Right	0	0.0	4	83.0	0	0.0	0	0.0	0	0	0	0	0	0
53	53+000 to 53+500	Left	7	89.0	5	61.5	0	0.0	0	0.0	0	0	0	0	0	0
		Right	1	1.3	1	7.1	0	0.0	0	0.0	1	41	0	0	0	0
	53+500 to 54+000	Left	0	0.0	2	112.4	0	0.0	0	0.0	0	0	0	0	0	0
		Right	0	0.0	5	78.2	2	9.4	1	10.4	0	0	0	0	0	0
54	54+000 to 54+500	Left	0	0.0	2	43.8	0	0.0	0	0.0	0	0	0	0	0	0
		Right	0	0.0	9	252.6	0	0.0	0	0.0	0	0	0	0	0	0
	54+500 to 54+800	Left	0	0.0	12	314.9	2	33.7	0	0.0	2	36	0	0	0	0
		Right	0	0.0	4	39.0	0	0.0	0	0.0	1	29	1	36	0	0
Sub-total			29	348.3	191	4,077.2	8	143.9	1	10.4	5	131	1	36	1	22

Table H-3-2(1/4) Affected fruite trees (15m from the road center on both sides: Temporally ROW)

Station (Km)		Left / Right side	Fruite trees								Others
			Mango (Nos.)	Coconut (Nos.)	Jack fruite (Nos.)	Guava (Nos.)	Kampinath (Nos.)	Lemon (Nos.)	Pulasan (Nos.)	Papaya (Nos.)	(Nos.)
0	0+000 to 0+500	Left	1	0	1	0	0	0	0	0	5
		Right	2	0	4	0	0	0	0	0	4
	0+500 to 1+000	Left	5	2	1	0	1	0	0	3	6
		Right	7	6	4	1	0	0	1	2	2
1	1+000 to 1+500	Left	3	1	4	0	0	0	0	2	8
		Right	5	2	2	0	1	0	0	0	21
	1+500 to 2+000	Left	5	4	8	2	0	0	1	6	12
		Right	9	8	5	2	0	0	0	0	47
2	2+000 to 2+500	Left	0	0	0	0	6	0	0	3	22
		Right	11	16	1	0	0	0	2	2	25
	2+500 to 3+000	Left	17	5	17	2	0	0	0	5	20
		Right	9	4	7	1	0	0	1	5	20
3	3+000 to 3+500	Left	3	3	1	6	1	0	2	13	20
		Right	10	21	3	4	1	0	0	3	23
	3+500 to 4+000	Left	0	1	5	5	0	0	4	15	23
		Right	7	67	16	1	0	0	2	3	23
4	4+000 to 4+500	Left	5	3	18	3	1	0	2	6	16
		Right	5	45	19	1	3	0	5	7	32
	4+500 to 5+000	Left	3	2	16	4	2	0	0	11	14
		Right	6	34	28	3	9	1	8	12	20
5	5+000 to 5+500	Left	2	15	5	3	6	0	0	2	7
		Right	6	17	16	1	5	1	1	6	6
	5+500 to 6+000	Left	12	14	14	1	9	1	5	0	2
		Right	3	27	19	0	7	0	1	2	8
6	6+000 to 6+500	Left	7	14	13	1	16	0	0	4	6
		Right	3	17	20	3	5	0	1	3	6
	6+500 to 7+000	Left	4	0	2	0	0	0	0	4	12
		Right	5	39	7	0	1	0	0	1	4
7	7+000 to 7+500	Left	1	0	0	0	0	0	0	6	10
		Right	5	9	0	0	0	0	0	4	107
	7+500 to 8+000	Left	5	14	10	0	4	0	3	1	2
		Right	3	26	2	6	1	0	0	0	82
8	8+000 to 8+500	Left	2	1	1	55	0	0	0	2	10
		Right	11	14	16	0	1	0	1	1	30
	8+500 to 9+000	Left	11	6	8	1	2	0	0	2	4
		Right	10	48	18	2	10	0	8	1	17
9	9+000 to 9+500	Left	2	5	5	4	4	0	0	0	10
		Right	15	17	10	1	4	0	6	4	23
	9+500 to 10+000	Left	12	4	8	4	4	0	3	10	37
		Right	7	27	17	0	10	1	3	6	45
10	10+000 to 10+500	Left	7	7	10	0	4	0	8	4	31
		Right	6	35	18	5	0	1	9	2	56
	10+500 to 11+000	Left	12	5	14	1	6	1	8	0	39
		Right	7	23	35	1	17	0	1	4	46
11	11+000 to 11+500	Left	9	3	15	4	7	0	0	10	23
		Right	11	19	14	0	9	0	0	7	36
	11+500 to 12+000	Left	0	2	0	0	0	0	0	0	3
		Right	14	16	12	1	1	0	1	11	39
12	12+000 to 12+500	Left	4	0	2	1	2	0	0	2	14
		Right	14	20	11	2	8	0	6	0	35
	12+500 to 13+000	Left	23	6	3	5	5	1	0	52	9
		Right	23	23	8	4	9	0	9	70	27
13	13+000 to 13+500	Left	10	3	12	7	5	3	3	4	23
		Right	2	22	15	1	5	0	9	3	42
	13+500 to 14+000	Left	1	3	4	1	2	1	2	0	9
		Right	1	7	1	0	0	0	2	0	16
14	14+000 to 14+500	Left	7	13	6	2	1	1	4	5	23
		Right	6	27	5	1	2	0	10	13	21
	14+500 to 15+000	Left	9	6	2	12	6		2	5	30
		Right	13	33	18	2	11	3	10	6	53
			418	811	556	167	214	15	144	355	1366

Table H-3-2(2/4) Affected fruite trees (15m from the road center on both sides: Temporally ROW)

Station (Km)		Left / Right side	Fruite trees								Others
			Mango (Nos.)	Coconut (Nos.)	Jack fruite (Nos.)	Guava (Nos.)	Kampinath (Nos.)	Lemon (Nos.)	Pulasan (Nos.)	Papaya (Nos.)	(Nos.)
15	15+000 to15+500	Left	6	20	11	3	7	1	10	12	30
		Right	5	28	18	4	10	0	33	4	41
	15+500 to 16+000	Left	8	9	13	3	16	1	12	8	39
		Right	12	30	19	2	25	1	10	19	52
16	16+000 to 16+500	Left	7	2	6	7	12	3	6	0	29
		Right	14	21	34	2	25	2	3	4	54
	16+500 to 17+000	Left	21	17	10	6	8	0	4	4	38
		Right	5	12	14	8	7	0	4	3	45
17	17+000 to 17+500	Left	19	43	10	3	4	0	6	6	35
		Right	8	35	18	4	6	0	1	17	34
	17+500 to 18+000	Left	8	12	8	1	3	1	4	3	17
		Right	1	17	4	0	1	0		2	20
18	18+000 to 18+500	Left	15	37	6	5	20	0	10	7	15
		Right	14	34	21	6	15	0	3	9	36
	18+500 to 19+000	Left	6	9	6	0	1	0	3	3	15
		Right	10	46	8	1	8	0	3	0	30
19	19+000 to 19+500	Left	4	10	6	2	1	0	1	1	27
		Right	13	24	8	0	1	0	3	2	28
	19+500 to 20+000	Left	3	15	3	5	0	0	1	4	32
		Right	12	65	8	0	5	0	9	7	23
20	20+000 to 20+500	Left	0	0	1	4	0	0	0	2	10
		Right	11	27	11	3	5	0	1	5	35
	20+500 to 21+000	Left	0	27	0	0	0	0	0	0	5
		Right	6	32	9	2	2	0	2	2	13
21	21+000 to 21+500	Left	10	45	10	0	0	0	6	2	20
		Right	12	34	22	2	5	0	9	10	33
	21+500 to 22+000	Left	2	4	0	0	0	0	0	0	23
		Right	17	9	32	1	4	1	9	9	32
22	22+000 to 22+500	Left	4	1	5	2	1	0	0	2	18
		Right	20	13	38	3	4	0	1	1	25
	22+500 to 23+000	Left	3	0	3	0	1	0	0	2	45
		Right	5	12	11	4	4	0	0	0	23
23	23+000 to 23+500	Left	5	2	2	0	5	0	0	2	11
		Right	11	10	9	3	5	0	1	1	40
	23+500 to 24+000	Left	0	24	4	0	0	0	0	1	7
		Right	18	28	20	3	6	0	1	1	23
24	24+000 to 24+500	Left	10	2	3	3	1	0	0	5	23
		Right	11	15	14	2	0	0	1	2	36
	24+500 to 25+000	Left	3	4	2	5	1	0	0	5	39
		Right	11	33	20	5	6	0	1	11	31
25	25+000 to 25+500	Left	3	4	0	3	1	0	0	11	16
		Right	20	25	23	2	3	1	2	3	29
	25+500 to 26+000	Left	15	3	2	5	2	0	0	2	15
		Right	21	59	20	2	6	0	2	4	29
26	26+000 to 26+500	Left	9	0	3	7	0	0	0	0	22
		Right	15	21	26	3	7	0	2	8	38
	26+500 to 27+000	Left	2	4	1	1	2	0	0	2	14
		Right	8	8	6	1	5	1	0	7	22
27	27+000 to 27+500	Left	1	0	1	3	1	0	0	10	8
		Right	4	20	12	0	8	0	1	1	37
	27+500 to 28+000	Left	2	0	0	1	3	0	0	0	7
		Right	7	45	41	0	4	0	3	12	16
28	28+000 to28+500	Left	0	2	3	3	0	0	0	6	20
		Right	3	56	15	1	0	0	1	4	23
	28+500 to 29+000	Left	4	0	4	3	1	0	0	4	11
		Right	14	27	19	3	7	1	0	12	33
29	29+000 to 29+500	Left	0	0	4	2	3	0	0	4	15
		Right	0	0	0	0	0	0	0	5	56
	29+500 to 30+000	Left	8	15	7	6	4	0	0	0	29
		Right	0	1	2	1	1	0	0	0	63
			486	1098	636	151	283	13	169	273	1635

Table H-3-2(3/4) Affected fruite trees (15m from the road center on both sides: Temporally ROW)

Station (Km)		Left / Right side	Fruite trees								Others
			Mango (Nos.)	Coconut (Nos.)	Jack fruite (Nos.)	Guava (Nos.)	Kampinath (Nos.)	Lemon (Nos.)	Pulasan (Nos.)	Papaya (Nos.)	(Nos.)
30	30+000 to 30+500	Left	2	0	0	4	1	0	0	0	12
		Right	1	0	11	4	3	0	0	1	19
	30+500 to 31+000	Left	0	0	1	2	0	0	0	5	18
		Right	8	18	22	1	2	1	1	3	42
31	31+000 to 31+500	Left	34	8	1	0	1	0	0	1	46
		Right	20	54	4	2	2	0	4	6	64
	31+500 to 32+000	Left	3	0	0	0	0	0	0	1	86
		Right	3	26	5	0	0	0	2	4	86
32	32+000 to 32+500	Left	0	0	0	7	0	0	0	2	2
		Right	0	1	0	3	0	0	0	0	77
	32+500 to 33+000	Left	0	0	0	6	0	0	0	5	3
		Right	2	10	15	0	0	1	0	23	31
33	33+000 to 33+500	Left	0	14	0	12	3	0	0	5	7
		Right	4	50	23	0	1	0	3	20	34
	33+500 to 34+000	Left	0	1	2	1	0	0	0	2	5
		Right	5	53	24	2	1	2	1	17	25
34	34+000 to 34+500	Left	0	11	6	14	0	1	0	5	21
		Right	3	28	8	1	1	0	2	16	48
	34+500 to 35+000	Left	3	12	28	9	1	0	1	7	20
		Right	5	35	17	0	1	3	11	10	44
35	35+000 to 35+500	Left	3	3	17	2	0	0	0	3	39
		Right	4	33	15	5	0	0	0	3	25
	35+500 to 36+000	Left	2	8	10	2	2	1	0	9	27
		Right	1	30	7	1	0	1	4	1	25
36	36+000 to 36+500	Left	0	3	2	12	0	0	0	2	11
		Right	7	31	12	6	1	1	1	13	35
	36+500 to 37+000	Left	0	0	0	4	1	0	0	0	2
		Right	1	9	4	1	0	0	0	9	20
37	37+000 to 37+500	Left	0	0	0	4	2	0	0	2	228
		Right	4	4	49	2	0	0	1	20	48
	37+500 to 38+000	Left	2	0	1	5	0	1	0	6	18
		Right	13	14	15	2	1	2	0	5	56
38	38+000 to 38+500	Left	0	1	13	11	0	0	0	9	30
		Right	5	10	20	5	0	0	1	1	26
	38+500 to 39+000	Left	0	4	3	3	0	0	0	13	22
		Right	2	6	22	2	0	1	0	32	36
39	39+000 to 39+500	Left	1	7	8	6	0	0	0	19	36
		Right	5	13	28	2	1	0	0	12	35
	39+500 to 40+000	Left	0	0	4	3	0	0	0	30	35
		Right	12	3	35	2	1	1	0	22	42
40	40+000 to 40+500	Left	0	0	2	14	0	0	0	3	29
		Right	4	1	37	5	0	0	0	14	66
	40+500 to 41+000	Left	0	0	2	5	0	0	0	11	18
		Right	2	0	13	1	0	0	0	16	61
41	41+000 to 41+500	Left	0	1	11	4	0	0	0	24	21
		Right	1	2	10	2	0	0	0	13	63
	41+500 to 42+000	Left	0	0	0	1	0	0	0	0	143
		Right	0	0	2	0	0	0	0	0	11
42	42+000 to 42+500	Left	0	0	0	1	0	0	0	0	29
		Right	0	0	0	0	0	0	0	1	4
	42+500 to 43+000	Left	0	0	0	0	0	0	0	0	3
		Right	0	0	0	0	0	0	0	0	2
43	43+000 to 43+500	Left	0	1	0	0	0	0	0	29	33
		Right	0	0	0	0	0	0	0	0	2
	43+500 to 44+000	Left	1	0	0	0	0	0	0	0	7
		Right	0	1	0	0	0	0	0	0	9
44	44+000 to 44+500	Left	0	2	0	1	0	0	0	2	110
		Right	0	0	1	2	0	0	0	4	36
	44+500 to 45+000	Left	1	2	0	8	0	0	0	0	21
		Right	6	4	7	3	0	1	2	8	66
			170	514	517	195	26	17	34	469	2220

Table H-3-2(4/4) Affected fruite trees (15m from the road center on both sides: Temporally ROW)

Station (Km)		Left / Right side	Fruite trees								Others
			Mango (Nos.)	Coconut (Nos.)	Jack fruite (Nos.)	Guava (Nos.)	Kampinath (Nos.)	Lemon (Nos.)	Pulasan (Nos.)	Papaya (Nos.)	(Nos.)
45	45+000 to 45+500	Left	5	5	0	16	1	0	1	3	48
		Right	10	30	9	3	1	0	1	9	96
	45+500 to 46+000	Left	5	11	6	20	2	0	1	8	37
		Right	6	22	6	4	0	0	2	8	58
46	46+000 to 46+500	Left	11	30	1	11	0	0	0	0	4
		Right	5	45	0	6	0	0	0	3	44
	46+500 to 47+000	Left	7	20	1	5	1	0	1	0	9
		Right	2	5	14	6	0	2	3	3	45
47	47+000 to 47+500	Left	2	0	1	14	2	0	0	0	22
		Right	1	10	14	11	2	0	0	4	60
	47+500 to 48+000	Left	1	1	0	5	0	0	0	3	40
		Right	2	17	16	2	1	0	0	8	49
48	48+000 to 48+500	Left	0	0	0	0	0	0	0	1	7
		Right	0	0	0	0	0	0	0	4	25
	48+500 to 49+000	Left	0	0	0	0	0	0	0	0	13
		Right	0	2	1	0	0	0	0	2	38
49	49+000 to 49+500	Left	0	1	11	4	1	0	4	2	17
		Right	4	3	25	4	4	0	1	9	39
	49+500 to 50+000	Left	1	0	0	8	1	0	0	2	20
		Right	24	16	20	7	2	0	1	19	44
50	50+000 to 50+500	Left	1	0	3	8	1	0	0	22	13
		Right	3	17	1	1	1	0	0	9	32
	50+500 to 51+000	Left	2	3	5	1	0	0	0	15	9
		Right	7	16	9	4	0	0	1	1	59
51	51+000 to 51+500	Left	2	0	7	4	3	0	0	9	24
		Right	10	14	15	21	2	0	1	0	29
	51+500 to 52+000	Left	2	11	2	11	0	2	0	12	32
		Right	7	12	4	22	4	0	0	5	37
52	52+000 to 52+500	Left	7	1	0	8	4	0	0	1	24
		Right	0	7	1	0	1	0	0	0	34
	52+500 to 53+000	Left	13	3	5	7	2	3	1	11	26
		Right	26	24	20	14	3	0	3	1	50
53	53+000 to 53+500	Left	7	0	3	5	1	0	0	6	18
		Right	16	22	9	10	7	0	0	9	52
	53+500 to 54+000	Left	7	10	10	1	2	1	2	10	10
		Right	12	30	11	3	0	0	2	2	46
54	54+000 to 54+500	Left	1	7	6	4	2	0	5	4	11
		Right	2	0	3	0	1	0	0	7	16
	54+500 to 55+000	Left	9	20	4	7	1	0	7	4	5
		Right	1	14	2	1	1	1	19	1	30
55	55+000 to 55+309	Left									
		Right									
	54+800 to 55+342	Left									
		Right									
Sub-total			221	429	245	258	54	9	56	217	1272

H-4. Resettlement Compensation Cost

TableH-4-1 Resettlement Compensation Cost Base

Classification	Unit	(USD)
I. Allowances		
Description Allowance	each	$40.00
Widow	each	$20.00
Disable	each	$20.00
Income<$ 10/month	each	$20.00
Resettlement Allowance	each	$40.00
Provincial Government Payment for resettlement Lot Development	each	$300.00
II. Structures		
House Type 1 (Leave roofed)	m²	$4.50
House Type 2 (Zin plate roofed)	m²	$12.00
House Type 3 (Tile roofed)	m²	$85.00
House Type 4 (Concrete)	m²	$140.00
III. Other Fixed Assets		
Gas Station	each	$3,000.00
Staff Market	each	$4.50
Wall, gate and housing of pagoda	each	$3,000.00
Wooden Bridge	m²	$4.50
Concrete Bridge	m²	$12.00
Digging Wells	each	$50.00
Pump Wells	each	$75.00
Wooden Fence	m	$0.75
Concrete Fence	m	$4.86
Crocodile Farm	m²	$4.86
Barbed Wire Fence	m	$0.75
Zinc Fence	m	$0.75
Steel Fence	m	$4.86
Tomb	m²	$50.00
IV. Lands		
-Home Land Type 1	m²	$20.00
-Home Land Type 2	m²	$15.00
-Home Land Type 3	m²	$8.00
-Home Land Type 4	m²	$22.00
-Field Land	m²	$0.50
-Damage Land	m²	$0.30

Classification	Unit	(USD)
V. Fruit Tree		
Mango tree	each	$30.00
Tamarind tree	each	$10.00
Coconut tree	each	$15.00
Palm tree	each	$ 8.00
Bamboo tree	thicket	$15.00
Banana tree	thicket	$0.80
Jack fruit tree	each	$15.00
Otaheite tree	each	$15.00
Papaya tree	each	$2.50
Guava tree	each	$2.50
Cockcomb tree	each	$10.00
Lemon tree	each	$3.50
Soursop tree	each	$5.00
Custard apple tree	each	$3.00
Longan tree	each	$30.00
Milk tree	each	$30.00
Lichi tree	each	$30.00
Oreca palm tree	each	$5.00
Marian plum tree	each	$30.00
Pomegranate tree	each	$2.50
Pulasan tree	each	$15.00
Cashew-nut tree	each	$2.50
Vegetables	thicket	-
Timber	each	$25.00
Others	each	-

Source: Inter-Ministerial Resettlement Committee (IRC)

H-5. Approval of IEIA (Initial Environmental Impact Assessment)

គណៈរដ្ឋមន្ត្រី
ក្រសួងបរិស្ថាន

លេខ: ២៤១ ប.ស្ថ ស.ជ.ស

ព្រះរាជាណាចក្រកម្ពុជា
ជាតិ សាសនា ព្រះមហាក្សត្រ

រាជធានីភ្នំពេញ, ថ្ងៃទី ១៥ ខែ វិច្ឆិកា ឆ្នាំ ២០០២

គោរពជូន

ឯកឧត្តមរដ្ឋមន្ត្រីក្រសួងសាធារណៈការ និងដឹកជញ្ជូន

កម្មវត្ថុ: ការណែនាំ និង ផ្តល់យោបល់លើរបាយការណ៍វាយតំលៃហេតុប៉ះពាល់បរិស្ថានដំបូង នៃគំរោងសាងសង់ផ្លូវជាតិលេខ១ ពីភ្នំពេញទៅអ្នកលឿង ។

យោង: - លិខិតលេខ ២៧៥ អសក ចុះថ្ងៃទី ១៥ ខែ តុលា ឆ្នាំ ២០០២ របស់ក្រសួងសាធារណៈការ និងដឹកជញ្ជូន។

តបតាមកម្មវត្ថុ និងយោងខាងលើ ខ្ញុំមានកិត្តិយសសូមជំរាបជូនឯកឧត្តមរដ្ឋមន្ត្រីជ្រាបថា: ក្រសួងបរិស្ថានបានឯកភាពជាគោលការណ៍ លើរបាយការណ៍វាយតំលៃហេតុប៉ះពាល់បរិស្ថានដំបូង នៃគំរោងសាងសង់ផ្លូវជាតិលេខ១ ពីភ្នំពេញទៅអ្នកលឿង ដែលបានផ្ញើមកក្រសួងបរិស្ថានដើម្បីពិនិត្យ និងផ្តល់យោបល់ ។ ដោយឡែក ក្រសួងសូមផ្តល់អនុសាសន៍មួយចំនួនដូចខាងក្រោម:

- សិក្សាឱ្យបានទូលំទូលាយបន្ថែមទៀតទូវហេតុប៉ះពាល់បរិស្ថានសំខាន់ៗ (*បរិស្ថានសង្គម* និង *បរិស្ថានធម្មជាតិ*) និងរកវិធានការកាត់បន្ថយ ឱ្យបានសមស្រប និងមានប្រសិទ្ធភាព
- បញ្ជាក់ពីវិធីសាស្ត្រនៃការសិក្សា និងប្រភពទិន្នន័យដែលប្រមូលបានឱ្យបានច្បាស់លាស់
- រៀបចំរបាយការណ៍វាយតំលៃហេតុប៉ះពាល់បរិស្ថានដំបូងជាភាសាខ្មែរ ។

ម្យ៉ាងទៀត ចំពោះដំណាក់ការសាងសង់ និងដំណាក់ការប្រតិបត្តិគំរោង ភាគីម្ចាស់គំរោងត្រូវធានាឱ្យបានទូវនិរន្តរភាពបរិស្ថានទាំងសង្គម និងធម្មជាតិ ។

សេចក្តីដូចបានជំរាបជូនខាងលើ សូមឯកឧត្តមមេត្តាជ្រាបតាមការគួរ ។

សូមឯកឧត្តមទទួលនូវការរាប់អានដ៏ស្មោះអំពីខ្ញុំ ។

ចំលងជូន
- អគ្គនាយកដ្ឋានបច្ចេកទេស
- ឯកសារ

ម៉ុក_ម៉ារ៉ែត
បណ្ឌិត.ជីវិទ្យា

- Translation to English

Ministry of Environment | **Kingdom of Cambodia**

No: 241 MoE | **Nation Religion King**

Phnom Penh, 15th November 2002

Dear: Minister of Public Works and Transport;

Purpose: Reviewing and giving the recommendation on the final report of the Initial Environmental Impact Assessment (IEIA) of the feasibility study on the improvement of the National Road No. 1 project from Phnom Penh to Neak Leoeung.

Reference: The letter **No. 275** dated on 15th October 2002 from director general of Public Works and Transport.

Referring to the above purpose, I have the great pleasure to tell you that Ministry of Environment (MoE) has approved the final report of Initial Environmental Impact Assessment (IEIA) of the feasibility study on the improvement of the National Road No. 1 project from Phnom Penh to Neak Leoeung, which has been sent to MoE for reviewing and commend. So MoE would like to provide some recommendations such as:

- Study more detail about environmental impacts on (social and natural environment) and the efficient and suitable measures to mitigate;
- Clearly identify the studied methodologies and the data sources;
- Translate in Khmer version of the final report of Initial Environmental Impact Assessment (IEIA).

Moreover, when the construction and project implement are started the project owner should strongly ensure the sustainable of social and natural environment.

Best regards,

CC:
- Technical Directorate General
- Document Unit

E.H. Dr. Mok Mareth
Minister of Environment

H-6. Study on Alternatives for Reduction of 1805 Houses to be Resettled

1. Premises
   * Study objective: Setting out road improvement plan taking account of flood prevention
   * Right of way: 60 meters wide land acquired by law along the existing road (30m from the center line at both side). No additional land acquisition is required.
   * Resettlement of houses: Resettlement to the area outside of the 30m wide tentative road (15m from the center line at both side).

2. Results of the Study

   The number of houses to be resettled cannot be reduced from 1805, even though minimum 14m wide road is proposed instead of 14 to 24 meter wide road, because it is stipulated to acquire 30m wide right-of-way at least for road improvement.

3. Alternative Plans

   Alternative-1

   (1) Outline

   Existing section that is 7 km long road section from the west end shall be rehabilitated at only pavement and shoulder. Road elevation is not raised because the flood prevention is not considered at this section.

   (2) Result

   Number of houses to be resettled will be reduced to approximately 1200 houses.

   (3) Impact to the improvement effect
      1) Maintenance cost will increase because floods may affect this section.
      2) Traffic safety is not assured because slower traffic is not separated from fast one.
      3) According to the traffic demand forecast, present road will be saturated by projected traffic volume in several years. This alternative can be a bottleneck on NR1.
      4) The effective improvement to the rest of the project road is restricted.

   Alternative-2

   (1) Outline

   The provision to acquire minimum 14m wide right-of-way shall be disregarded.

   (2) Result

   Number of houses to be resettled will be reduced to approximately 1600 houses.

   (3) Impact to the improvement effect
      1) Acquisition of land for other national road projects is complied with the same provision. This exception may give adverse effect to the subsequent projects.
      2) This exception will give adverse effect to the government policy to let the residents know that ownership of land belongs to the nation by the resettlement of houses under the law.

H-7. Actual Practices of MPWT on Public Information Campaign

Stage-1: The Governor of Kandal informs the relevant district chiefs and commune chiefs by his letter of the necessity of evacuating PAPs from 30 m wide ROW before the construction works commence. It is also informed that the resettlement will be carried out together with compensation.

Stage-2: The person-in-charge of MPWT will visit the relevant district chiefs and commune chiefs to explain the due procedure to resettle PAPs and the way to compensate their property. Taking this opportunity, MPWT will deliver a pamphlet to the relevant district chiefs and commune chiefs as a part of Public Information Campaign.

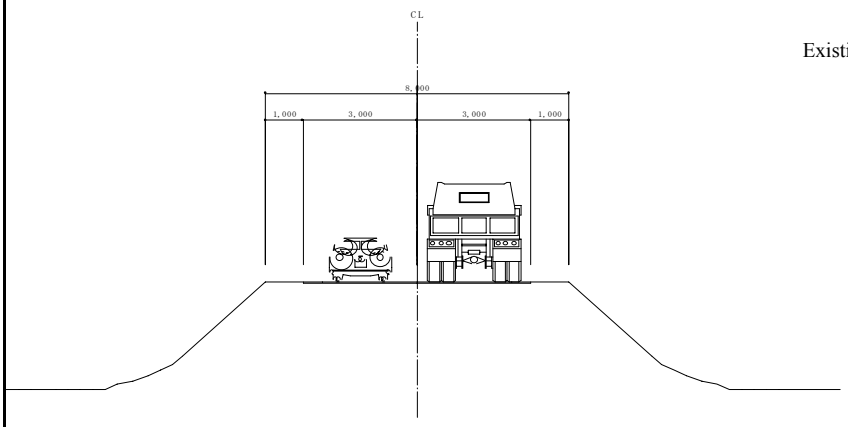
Stage-3: The relevant district chiefs and commune chiefs will organize the working group for resettlement. Since the member of the working group is not accustomed to the due procedure and the way of compensation, it is necessary for MPWT to conduct the training to them. It is also as a part of Public Information Campaign.

Stage-4: The member of the working group will visit the affected household individually to inform the implementation of project and to explain the due procedure to resettle PAPs and the way to compensate their property. Whenever they have difficult questions to answer or inquiries beyond their duty, they may consult with the person-in-charge of MPWT. Accordingly, although the Public Information Campaign is carried out the Control Key Step-1 of Compensation Procedure for Resettlement, it may continue to the Control Key Step-2 in reality.

I. Construction

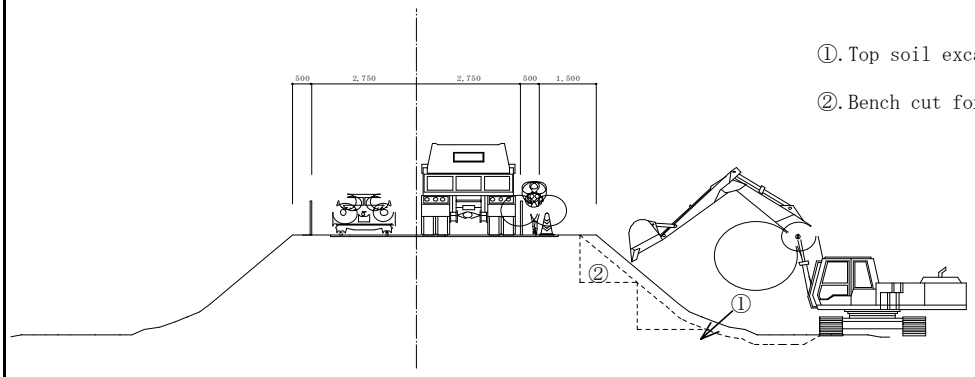
I-1. Construction Procedure of Roads

1. Existing condition



Existing condition (Typical)

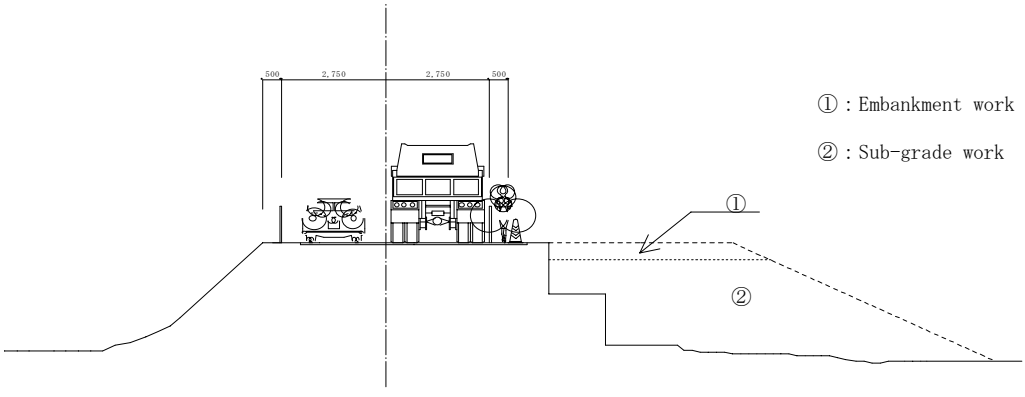
2.Top soil excavation and Bench cut for embankment



①. Top soil excavation (t=300)

②. Bench cut for embankment

3. Embankment and sub-grade work

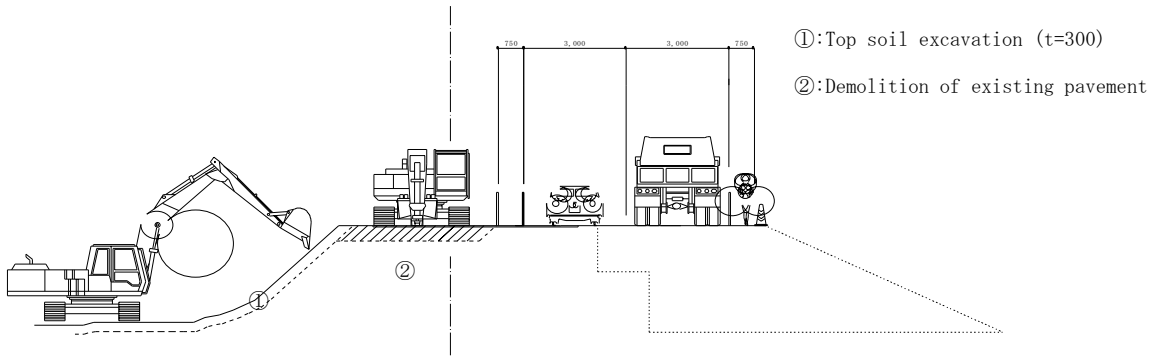


①：Embankment work

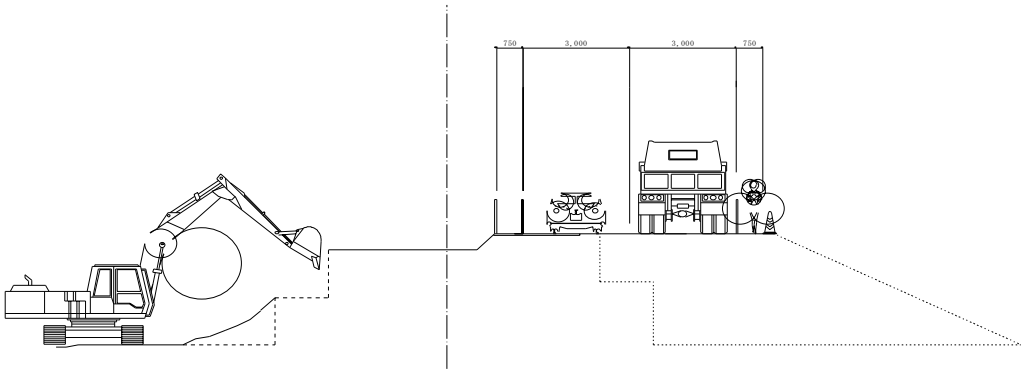
②：Sub-grade work

Fig. I - 1 Construction Procedure of Road (14m width) (1/4)

4.Top soil excavation and demolition of existing pavement



5.Bench cut work



6.Embankment and pavement work

① : Embankment work
② : Sub-grade work
③ : Sub-base work

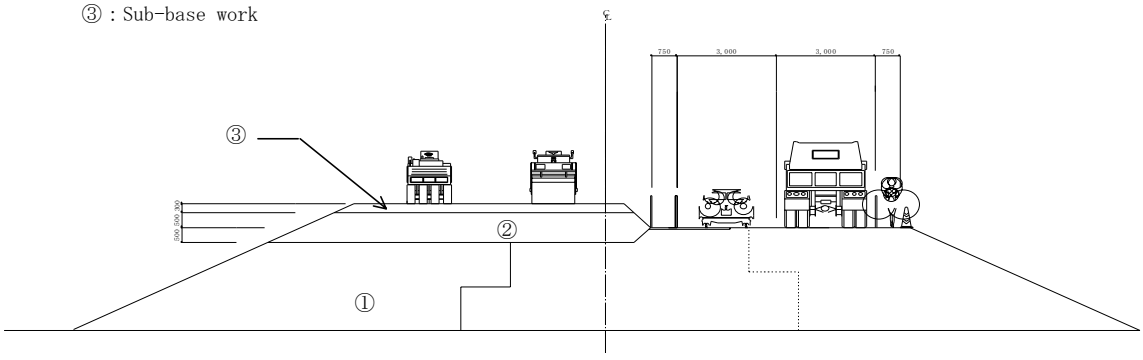
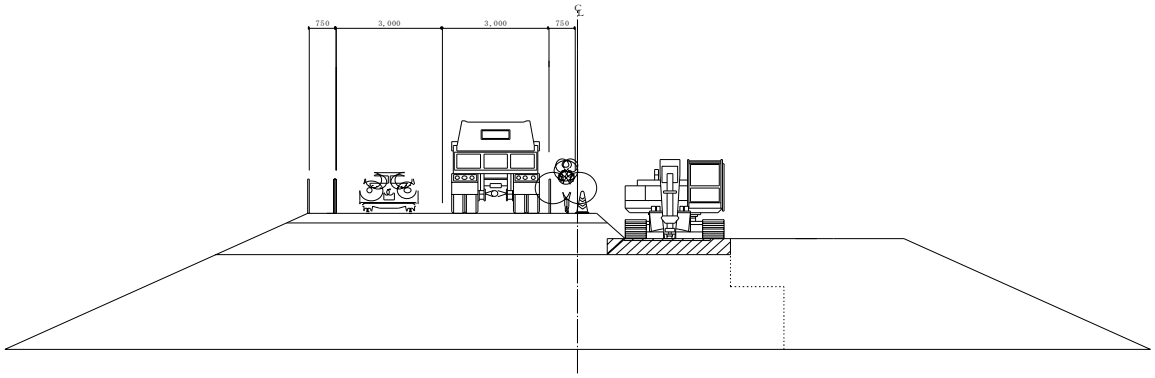


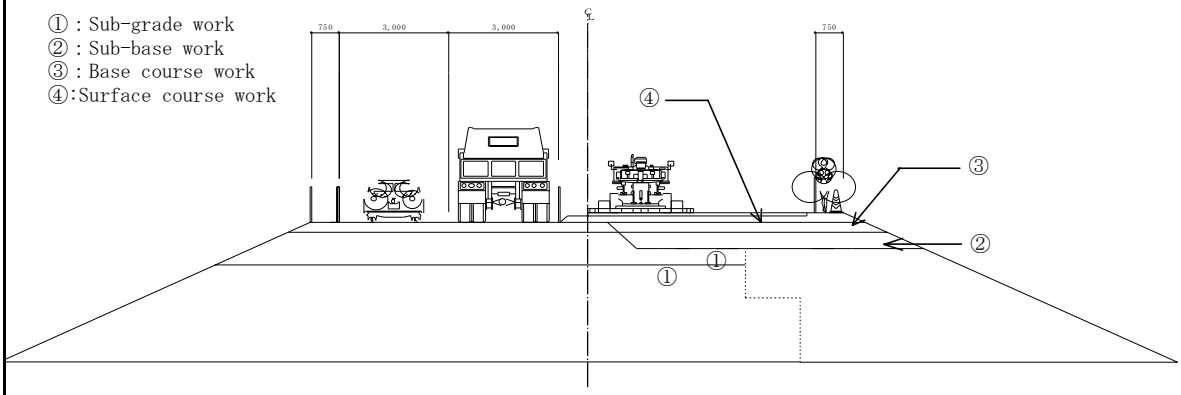
Fig. I - 1 Construction Procedure of Road (14m width) (2/4)

7.Demolition of existing pavement



8.Pavement work

①：Sub-grade work
②：Sub-base work
③：Base course work
④:Surface course work



9.Pavement work

①：Base course work

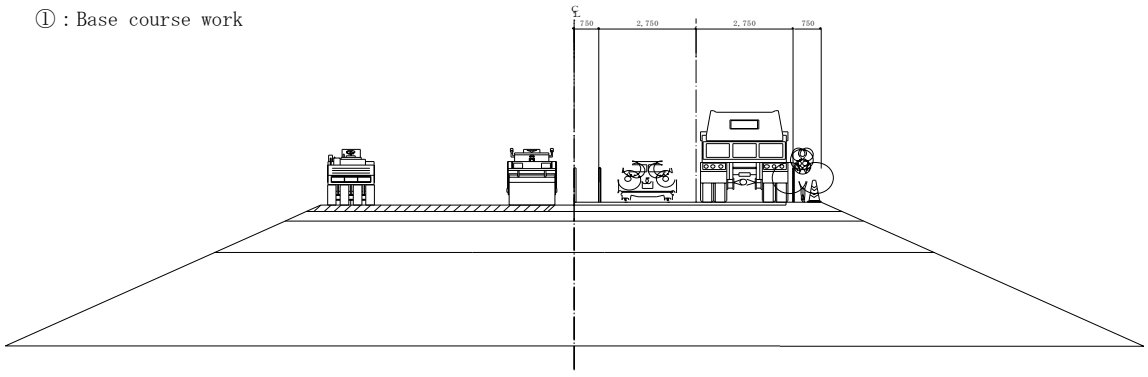
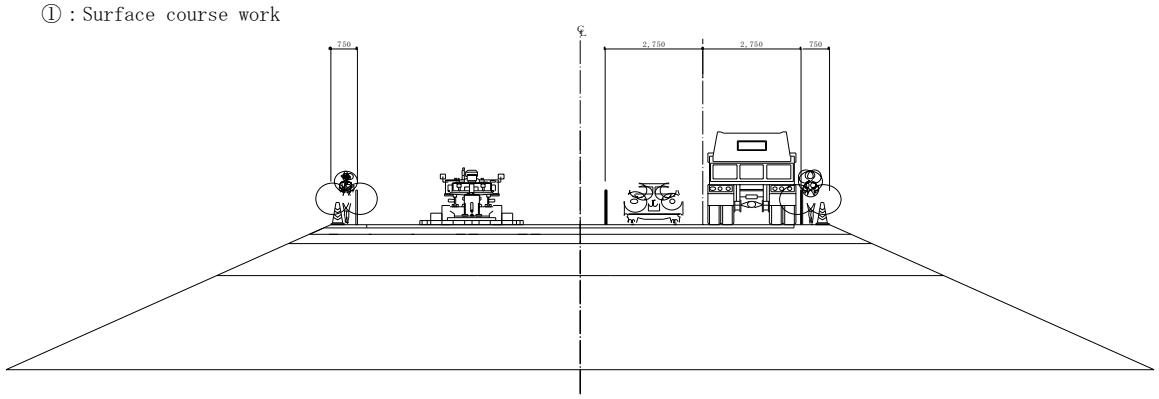


Fig. I - 1 Construction Procedure of Road (14m width) (3/4)

10.Pavement work

①：Surface course work



11.Completion

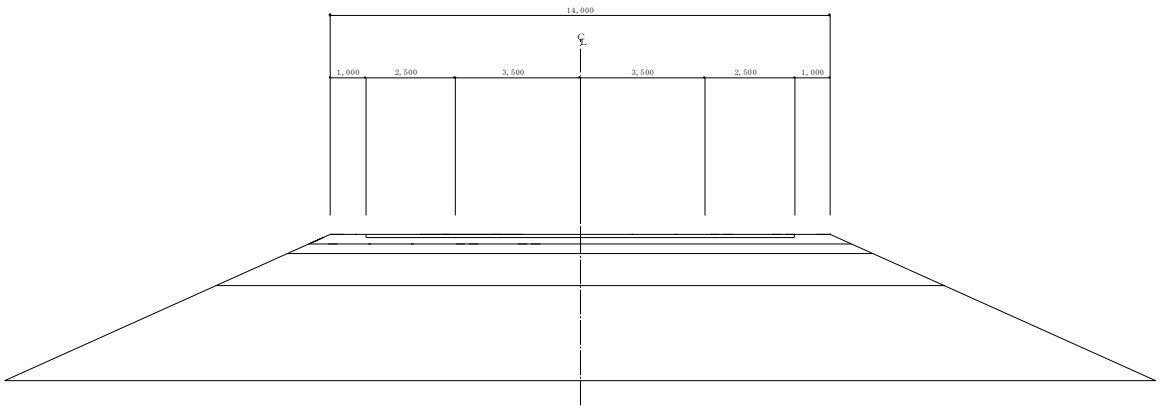


Fig. I - 1　Construction Procedure of Road (14m width) (4/4)

J. COST ESTIMATION

Rough Cost Estimate, ALT-III-B Total Width : 24m, 21m, 14m　　Pavement　　AS

Description			Unit	Q'ty	Unit Cost	Cost
Earth Work	Surface Stripping		m^3	140,750	0.76	107,000
	Surface Hauling		m^3	140,750	0.89	125,300
	Excavation		m^3	165,000	0.76	125,400
	Pavement Stripping		m^2	333,000	0.17	56,700
	Stripped Pavement Hauling		m^3	99,900	0.89	89,000
	Excavation for Embankment Material		m^3	1,233,432	0.76	937,500
	Embankment Hauling		m^3	1,233,432	1.39	1,714,500
	Embankment Spreading and Compunction		m^3	1,233,432	0.38	468,800
	Sub base Hauling	form Borrow pit	m^3	273,170	7.84	2,141,700
	Sub base Hauling	to Site	m^3	99,900	0.89	89,000
	Sub base Spreading and Compunction		m^3	373,070	0.60	223,900
	Slope Trimming		m^2	743,064	0.92	686,100
	Base Course Hauling		m^3	140,750	0.89	125,300
	Wet Masonry	Excavation	m^3	1,452	0.76	1,200
		Gravel	m^2	560	2.93	1,700
		Leveling Concrete	m^3	32	63.70	2,100
		Forming	m^2	2,400	10.12	24,300
		Concrete	m^3	600	69.16	41,500
		Wet Masonry	m^2	7,584	29.66	225,000
	Sod Facing		nos	1,404	7.00	9,900
	Sub Total					7,194,900
Pavement Work						
Type24-1	Sub base	t=300mm	m^2	6,180	5.97	36,900
0+000～0+300	Base Course	t=150mm	m^2	5,898	3.30	19,500
	Surface Course (Through Travel Lane)	60mm	m^2	4,200	7.53	31,700
		40mm	m^2	4,200	5.01	21,100
	Surface Course (Heard Shoulder)	40mm	m^2	1,200	5.01	6,100
Type24-2	Sub base	t=270mm	m^2	105,056	5.45	572,600
0+300～7+000	Base Course	t=150mm	m^2	92,460	3.30	305,200
	Surface Course (Through Travel Lane)	60mm	m^2	53,600	7.53	403,700
		40mm	m^2	53,600	5.01	268,500
	Surface Course (Heard Shoulder)	40mm	m^2	30,150	5.01	151,100
Type21-1	Sub base	t=240mm	m^2	101,140	4.93	498,700
7+000～13+500	Base Course	t=150mm	m^2	103,090	3.30	340,200
	Surface Course (Through Travel Lane)	60mm	m^2	52,000	7.53	391,700
		40mm	m^2	52,000	5.01	260,500
	Surface Course (Heard Shoulder)	40mm	m^2	29,250	5.01	146,500
Type24-3	Sub base	t=240mm	m^2	10,270	4.93	50,700
13+500～14+000	Base Course	t=150mm	m^2	9,830	5.62	55,300
	Surface Course (Through Travel Lane)	60mm	m^2	7,000	5.01	35,100
		40mm	m^2	7,000	5.01	35,100
	Surface Course (Heard Shoulder)	40mm	m^2	2,000	5.01	10,100
Type14-1	Sub base	t=290mm	m^2	281,600	5.80	1,633,300
14+000～36+000	Base Course	t=250mm	m^2	324,720	5.62	1,825,000
	Surface Course (Through Travel Lane)	50mm	m^2	165,000	6.13	1,010,700
		40mm	m^2	0	5.01	0
	Surface Course (Heard Shoulder)	40mm	m^2	99,000	5.01	495,900
Type14-2	Sub base	t=320mm	m^2	249,990	6.32	1,580,000
36+000～55+300	Base Course	t=200mm	m^2	286,260	4.65	1,331,200
	Surface Course (Through Travel Lane)	50mm	m^2	146,250	6.13	895,800
		40mm	m^2	87,750	5.01	439,500
DBST	Surface Course (Heard Shoulder)	DBST	m^2	0	3.06	0
Sidewalk	Base course	t=100	m^2	37,500	1.56	58,500
	Surface Course	t=30	m^2	37,500	4.42	165,900
	Sub Total					13,074,500
Bridge	42+400	Length:66m 3@22m	L/S	1		1,464,400
	42+850	Length:100m 4@25m	L/S	1		1,802,200
	47+967	Length:66m 3@22m	L/S	1		1,331,800
	Sub Total					4,598,200

Description			Unit	Q'ty	Unit Cost	Cost
Drainage Facilities						
0+000～0+600	Drainage Pipe	φ600	m	2,400	10.51	25,300
13+500～14+000	Excavation		m^3	2,784	1.22	3,400
	Gravel		m^2	1,800	2.93	5,300
	Leveling Concrete	Surrounded 180°	m^3	511	56.65	29,000
	Concrete Work		m^3	511	6.80	3,500
	RC Pipe	φ600	m	2,400	16.80	40,400
	Drainage Basin		nos	120	12.39	1,500
		Concrete	m^3	302	62.12	18,800
		Concrete Work	m^3	302	6.80	2,100
		Re-bar	kg	9,072	0.48	4,400
0+600～7+000	Side Ditch (L-type)					
		Concrete	m^3	1,357	62.12	84,300
		Concrete Work	m^3	8,320	6.80	56,600
		Re-bar	kg	33,920	0.48	16,300
	Drainage Pipe (Across Sidewalk)		m	1,067	7.51	8,100
	φ400@30m	Excavation	m^3	555	1.22	700
		Gravel	m^2	587	2.93	1,800
		Leveling Concrete	m^3	115	56.65	6,600
		Concrete Work	m^3	115	6.80	800
		RC Pipe	m	1,067	12.00	12,800
		Flow Treatment	L/S	1		47,000
	Drainage Basin		nos	450	12.39	5,600
		Concrete	m^3	153	62.12	9,600
		Concrete Work	m^3	153	6.80	1,100
		Re-bar	kg	4,590	0.48	2,300
	ﾎﾞｯｸｽｶﾙﾊﾞｰﾄ工					
	24+000 PC-1	Pipe 1.0m@1	L/S	1		14,100
	24+840 PC-2	Pipe 1.0m@1	L/S	1		13,200
	32+440 BC-1	2-cell Box	L/S	1		199,900
	32+760 BC-2	2-cell Box	L/S	1		219,100
	33+230 BC-3	2-cell Box	L/S	1		186,800
	36+900 BC-4	2-cell Box	L/S	1		217,500
	41+040 BC-5	2-cell Box	L/S	1		203,100
822,909,583	41+800 BC-6	2-cell Box	L/S	1		198,200
	43+500 BC-7	2-cell Box	L/S	1		200,100
	44+400 BC-8	2-cell Box	L/S	1		192,100
	46+960 BC-9	2-cell Box	L/S	1		183,300
	48+800 BC-10	2-cell Box	L/S	1		197,900
	50+033 BC-11	3-cell Box	L/S	1		234,700
		Sub Total				2,645,700
Road Facilities	Marking	Dash Line	m	41,300	0.54	22,400
		Continuous Line	m	199,200	0.52	104,000
	Signal	Regulation	nos	110	106.65	11,800
		Guide Sign	nos	7	1,000.00	7,000
	Signal		nos	5	16,000.00	80,000
	Street Lightning		nos	494	1,000.00	494,000
	Guard Post		nos	500	17.78	8,900
	per a post	Concrete	m^3	0.04	62.12	100
		Concrete Work	m^3	0.04	8.74	100
		Forming	m^2	0.81	9.94	100
		Re-bar	kg	5.4	0.48	100
		Painting	nos	1	1.58	100
		Installation	nos	1	2.72	100
		Hauling	t	48	2.72	200
	Approach Slope for Local Road	Sub Base Hauling	m^3	39,845	7.84	312,400
	Length 30m	Spreading and Compunction	m^3	39,845	0.60	24,000

Description			Unit	Q'ty	Unit Cost	Cost
	Toll Plaza		nos	1		423,800
		Embankment	m^3	6,936	1.77	12,300
		Sub Grade	m^3	1,293	8.44	11,000
		Base Course t=250	m^2	3,975	5.62	22,400
		Sub Base t=290	m^2	3,812	5.80	22,200
		Surface Course t=50	m^2	3,728	6.13	22,900
		Toll Booth	nos	1	250,000.00	250,000
		Weighbridge	nos	1		83,400
		Sub Total				423,800
	Pedestrian Bridge		nos	2		104,700
		Excavation	m^3	580	0.76	500
		Leveling Concrete	m^3	30	65.39	2,000
		Forming	m^2	804	9.94	8,000
		Re-bar	t	41	0.47	100
		Concrete	m^3	308	78.99	24,400
		Scaffolding	m^2	346	3.90	1,400
		Support	m^3	913	3.74	3,500
		Refilling	m^3	464	4.24	2,000
		Girder	m^3	17	130.20	2,300
		Girder Erection	nos	4	457.07	1,900
		Miscellaneous	nos	1	6,827.98	6,900
		Sub Total				52,400
	Livestock Refuge		nos	1		30,300
		Embankment	m^3	3,240	1.77	5,800
		Base Course	m^3	1,399	8.44	11,900
		Surface Course t=250	m^2	2,256	5.62	12,700
		Sub Total				30,300
	モトルモ停留所		nos	8		23,000
		Embankment	m^3	441	1.77	800
		Base Course	m^3	116	8.44	1,000
		Surface Course t=250	m^2	197	5.62	1,200
		Sub Total				2,900
	Sub Total					1,646,000
Temporary Work	Stock Yard		nos	14	3,446.55	48,300
		Gathering	m^3	535	0.44	300
		Land Dues	m^2／18months	216	14.87	3,300
	Plant Yard		nos	1	283,292.83	283,300
	Set Up	Excavation	m^3	36,874	0.76	28,100
		Hauling	m^3	36,874	1.39	51,300
		Spreading and Compunction	m^3	36,874	0.38	14,100
		Base Course t=150	m2	15,000	3.30	49,500
	Removal	Excavation	m^3	36,874	0.76	28,100
		Hauling Excess Soil	m^3	36,874	1.39	51,300
		Removal of Excess Soil	m^3	36,874	0.44	16,300
		Land Dues	m^2／30months	360	125.00	45,000
	Sub Total					331,600
		Total Direct Cost				29,490,900

Rough Cost Estimation　　Direct Cost * 1.30　　38,000,000

K. ECONOMIC ANALYSIS

K-1. Economic Evaluation

1. Vehicle Operating Cost

1.1 General

(1) Standard Vehicle Class and Typical Vehicle Models

Taking into account vehicle classification made in the traffic survey and adopted in the HDM 4, the following vehicle classes are adopted in this study:

－	Motor Cycle (New)	Honda 100
	Motor Cycle (Used)	Daelim 100 (1999 Product)
－	Car (New)	Toyota Corolla 1500
	Car (Used)	Toyota Camry 1800 (1995 Product)
－	Pick ups (New)	Hilux twin cab (2 WD)
	Pick ups (Used)	Hilux twin cab (2 WD)(1995 Product)
－	Minibus (New)	Toyota Hiace
	Minibus (Used)	Toyota Hiace (1995 Product)
－	Bus	
－	2-3 axle Truck	Hyundai (2.5 ton)
－	Heavy truck	Hino (8 ton)
－	Articulated Truck	Benz 2631 AS 35

(2) Economic versus Financial Prices

Economic appraisals of road plans should always be undertaken in economic terms. This requires that both construction and maintenance costs and vehicle operating costs are quoted net of all taxes, duties and the effects of the shortage of skilled labour and foreign exchange. Where a good is traded internationally this can be undertaken easily by identifying the tax and duty (or subsidy) elements of retail prices and removing these tax and duty. The residue is economic prices, including an element of profit for traders where markets are competitive.

However, many goods are not traded internationally, either because they cannot be transported or they have no value outside the country such as vehicle crew cost and passenger time saving. In these cases different methods of estimating economic prices are required. Two typical methods are by estimating the shadow wage factor (SWF) for

unskilled labour and the standard conversion factor (SCF).

(3) Identification of Tax and Duty Price Elements

For the purposes of the analysis, economic prices have been calculated in each case from first principles, involving the build up of the different price elements from published sources. Firstly retail prices have been estimated based on the survey of suppliers detailed below.

From these retail prices, elements of import duties, value added tax and retailers margin have been identified. By this method, the CIF or boarder prices for each goods have been estimated.

Information on import duties and VA tax has been extracted from "The Study on The Transport Master Plan of the Phnom Penh Metropolitan Area" November 2001, JICA and thee partial update produced in October 2002.

(4) Use of Shadow Wage Rate

Labour markets are often distorted by the Government policies, including minimum wage legislation, restrictions on import of certain types of skilled and semi-skilled labour so on. Each of these can lead to a divergence between the wage rate and its economic worth. The effects of these policies and restrictions will tend to be different for different types of labour.

Three general types of labour are usually defined within such an analysis, skilled, semi-skilled and unskilled. The former of these is generally highly mobile both within a country and internationally. It is therefore safe to assume that no market distortions can exist in this area.

Semi-skilled labours are however, generally mobile, certainly within a country, but often internationally. As with skilled workers it is therefore reasonable to assume that wage rates tend towards economic wage rates in these areas.

Unskilled labourers are however, generally immobile. In these cases wage rates are likely to be subject to market distortions. The most appropriate way to measure the economic wage of unskilled labour is to undertake an analysis of the opportunity cost i.e. how much would be the labourers earning in alternative employment. Since most of the construction

unskilled workers are employed in agriculture, the opportunity cost of this labour can therefore be considered to be its agricultural output.

The calculation of shadow wage rates for Cambodia is shown in Table K.1.1.

Table K.1.1 Shadow Wage Rate

	Skilled	Semi-Skilled	Unskilled
Index	1	1	1
Income Tax Rate	0%	0%	0%
Other Taxes Rate	0%	0%	0%
Average Agricultural Production Loss	0%	0%	52%
Shadow Wage Rate Factor	1.00	1.00	0.48

(5) Use Standard Conversion Factor

The Standard Conversion Factor (SCF) is a standard method of incorporating the effects of shortage of foreign exchange, the effects of market distortions, and the implications of protectionist trade policies within the economic appraisals. Since individual analysis of all of these effects is often a time consuming and fruitless process, the SCF avoids the need to undertake detailed analysis.

The factor takes into account the effect of import duties, value added tax on imports, and export taxes in assessing the true value of goods. These are calculated as alongside observed exchange rates to develop a conversion factor to be applied to price elements which are not the subject of individual study.

The SCF can be calculated using a standard set of formulae. The calculation for Cambodia is shown in Table K.1.2.

1.2 Exchange Rate

For the purpose of this study an exchange rate of US$1.00 = Riels3, 990 has been used. This represents an average of the rate prevailing in Phnom Penh in October 2002.

Table K.1.2 Calculation of Standard Conversion Factor

Item	Variables/Equations	Million US$			
		1998	1999	2000	2001
Imports					
Total Imports	TQM	4,018.1	4,413.9	5,858.6	6,276.8
Special Transactions	SM	1,108.2	654.2	652.9	688.7
Government Imports	NM	0.0	0.0	0.0	0.0
Net Imports	QM=TQM-SM-NM	2,909.9	3,759.7	5,205.7	5,588.1
Exports					
Total Exports	TQX	3,369.0	3,365.5	4,848.2	5,390.8
Re-exports	RXX	1,108.2	654.2	652.9	688.7
Net Exports	QX=TQX-RXX	2,260.8	2,711.3	4,195.3	4,702.1
Balance of Trade	dQ=QM-QX	649.1	1,048.4	1,010.4	886.0
Import Duties					
Total Import Duties	ITI	432.7	491.6	466.5	581.4
Relevant Import Duties	IT	372.5	415.3	372.8	356.4
Import Excise Duties	TR	60.2	76.3	93.7	225.0
Import Tariff Rate	TM=(IT-TR)/QM	0.078	0.077	0.048	0.021
Total Duties and Taxes on Imports	T=ITI-TR	372.5	415.3	372.8	356.4
Export Duties					
Total Duties and Taxes on Exports	E	2.7	16.5	15.8	18.5
Export Tax Rate	Tx=E/QX	0.001	0.006	0.004	0.004
Elasticties and Weights					
Elasticity of Supply	Es	1	1	1	1
Elasticity of Demand	Nd	-3	-3	-3	-3
Weight on Supply	Ws=Es/(Es-(Nd*(QM/QX)))	0.206	0.194	0.212	0.219
Weight on Demand	Wd=(Nd*(QM/QX))/(Es-(Nd*(QM/QX))	1.080	1.102	1.069	1.056
Official Exchange Rate	OER	3,774	3,814	3,859	3,924
Standard Conversion Factor					
Fraction of Current BOP Deficit Sustainab	F	90%	90%	90%	90%
Equilibrium Nominal Exchange Rate	ERR=OER*(1+((1-F)*dQ)/(Es*QX-Nd*(	3,796	3,843	3,879	3,940
Shadow Exchange Rate	SER=ERR*(Ws*(1-TX)+Wd*(1+TM)	5,201	5,303	5,164	5,107
Shadow Exchange Rate Factor	SERF=SER/OER	1.378	1.390	1.338	1.301
Standard Conversion Factor	SCF=OER/SER	0.726	0.719	0.747	0.768

Table K.1.3 Vehicle Prices

Unit:US $

	Typical Model	Retail Price	VAT (%)	VAT Amount	Specific Tax (%)	Spec. Tax Amount	Import Duty (%)	Import Duty Amount	CIF Price	Economic Cost
Motor Cycle	Honda 100, New	865	10%	62	0%	0	20%	123	615	681
	Daelim 100, Used (1999)	400	10%	30	0%	0	20%	59	295	312
Cars	Corolla 1500, New	32,000	10%	1,711	20%	3,422	40%	6,844	17,110	20,023
	Camry 1800, Used (1995)	10,000	10%	560	20%	1,120	40%	2,240	5,600	6,080
	Pajero 2800, New	84,227	10%	3,100	30%	9,300	90%	27,900	31,000	43,927
	Pajero 2800, Used (1996)	14,500	10%	812	10%	812	40%	3,248	8,120	9,628
Pickups	Toyota Hilux, New	18,000	10%	1,212	10%	1,212	15%	1,818	12,120	13,758
	Toyota Hilux, Used (1994)	5,000	10%	353	10%	353	15%	530	3,530	3,765
Buses	Toyota Hiace, New	31,000	10%	2,088	10%	2,088	15%	3,132	20,880	23,692
	Toyota Hiace, Used	18,000	10%	1,270	10%	1,270	15%	1,905	12,700	13,555
2-3 axle trucks	Hyundai, used (1995)	5,500	10%	388	10%	388	15%	582	3,880	4,142
Heavy Truck	Hino, 8 ton, Used	10,000	10%	705	10%	705	15%	1,058	7,050	7,533

Notes: Information obtained from various car dealers in Phnom Penh
Estimated by the JICA Study Team

Table K.1.4 Tyre Prices

Unit: US $

	Tyre Size	Retail Price	VAT	VAT Amount	Import Duty	Import Duty Amount	CIF Price	Economic Cost	No. of Tyres
Motor Cycle	100/17	20	10%	1.5	15%	2.2	14.8	16.3	2
Cars	165/13	104	10%	6.0	50%	30.1	60.2	67.9	4
Pickups	185/14	128	10%	9.5	15%	14.2	94.8	104.3	4
Minibuses	165/13	104	10%	7.7	15%	11.6	77.0	84.7	4
Buses	315-80 R22.5	840	10%	41.5	15%	62.2	414.8	736.3	6
2-3 axle trucks	650-16	288	10%	21.3	15%	32.0	213.3	234.7	6
4 axle trucks	1000-20	1,400	10%	103.7	15%	155.6	1,037.0	1,140.7	10

Notes: Information obtained from various car dealers in Phnom Penh
Estimated by the JICA Study Team

1.3 Inputs for Vehicle Operating Costs

1.3.1 Vehicle Prices

The vehicle prices have been estimated on the basis of the average price for new vehicles and second hand vehicles from new and second hand car dealers. Most vehicles are imported to Cambodia as second hand reconditioned vehicles. Especially, in cases of large bus and heavy trucks, a few suppliers of new vehicles could be found. In these cases, the second hand vehicle prices are only used in this study.

For the purpose of calculating the economic price of each vehicle these taxes and import duty has been subtracted from retail price. The resulting economic price incorporates elements of CIF price, retailer's margin, covering transport and profit costs. The resulting calculations are summarized in TableK.1.3.

1.3.2 Tyre Costs

The economic costs of tyres have been assessed in the same way as vehicles. Various suppliers in Phnom Penh were surveyed to assess average prices of different types of tyre.

New tyres are subject to import duty and IVA tax. The rates of these vary for different types of tyre. Import duty is principally charged at 15 % of the CIF. value of the tyre. (Cars at 50 %) The current rate of IVA tax is 10 % on all types of tyre.

For the purpose of calculating the economic price of each vehicle tyres, these taxes and import duty have been subtracted from retail price. The resulting economic price incorporates elements of CIF price, retailer's margin, covering transport and profit costs. The resulting calculations are summarized in Table K.1.4.

1.3.3 Fuel and Lubricants Costs

Fuel and lubricants prices have been estimated based on a survey of prices in Phnom Penh. There are a number of suppliers in here operating competitively. There are three types of fuel are available, gasoline which can subdivided into two; super and regular, and diesel.

Fuels are subject to import duty and an specific and IVA taxes. The import tax regulations make allowance for gasoline and diesel.

For the purpose of calculating the economic price of each fuel and lubricants prices, these taxes and import duty have been subtracted from retail price. The resulting economic price incorporates elements of CIF price, retailer's margin, covering transport and profit costs. The resulting calculations are summarized in Table K.1.5.

Table K.1.5 Fuel and Lubricants Costs

	Gasoline		Diesel	Lubricant
	Super	Regular		
Retailed Prices	0.589	0.564	0.414	2.60
Tax (Import Tax, Special Tax, VAT)	0.196	0.188	0.076	0.17
Economic Cost	0.393	0.376	0.337	2.43

1.3.4 Vehicle Maintenance Costs

(1) Spare Parts Costs

Fuel and lubricants prices have been estimated based on a survey of prices in Phnom Penh. There are a number of suppliers in here operating competitively. There are three types of fuel are available, gasoline which can subdivided into two; super and regular, and diesel.

Fuels are subject to import duty and an specific and IVA taxes. The import tax regulations make allowance for gasoline and diesel.

Table K.1.6 Spare Parts Cost

Unit: US $

	Motor Cycle	Cars	Pickups	Mini - buses	Buses	2-3 axle trucks	4 axle trucks	Articu-lated
Vehicle Prices (Economic Cost)	681	20,023	13,758	23,692	62,350	31,425	49,810	54,620
Spare Parts Rate (%)	1.0	0.83	0.83	1.0	1.0	0.83	0.83	0.83
Spare Parts Cost (Economic Cost)	6.8	166.9	114.7	236.9	623.5	261.9	355.8	390.1

(2) Maintenance Labour

Maintenance costs have been estimated based on a survey of the average monthly cost of skilled supervisor and skilled and semi-skilled mechanics in Phnom Penh. Applied to average working hours of 195 hours per month, proportion of working time and the Shadow Wage Rate Factor (SWR), it is calculated and is shown in Table K.1.7.

Table K.1.7 Maintenance Labour Cost

Unit: US $ / hr.

	Motor	Cars	Pickups	Minibuses	Buses	2-3 axle	4 axle
Wages per month							
Supervisor	250	250	250	250	250	250	250
Mechanic	100	100	100	100	100	100	100
Owner	0	0	0	0	0	0	0
Proportion of Time							
Supervisor	10%	25%	25%	25%	50%	50%	50%
Mechanic	40%	50%	50%	50%	50%	50%	50%
Owner	50%	25%	25%	25%	0%	0%	0%
Working hours per month	195	195	195	195	195	195	195
Average hourly rate for services	0.333	0.577	0.579	0.579	0.897	0.897	0.897
Shadow Wage Rate Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Economic Rate	0.333	0.577	0.579	0.579	0.897	0.897	0.897

1.3.5 Crew Cost

The crew costs have been estimated based on a survey of that of unit costs per drivers and conductor or helpers, number of staff per vehicle, and number of hours per vehicle. In Cambodia, unit costs for drivers are estimated at US $ 150 to $ 250 per worker depend on the type of vehicle, while the conductors or helpers are estimated to be one / half of the average monthly cost of skilled supervisor and skilled and semi-skilled mechanics in Phnom Penh. Applied to average working hours of 195 hours per month, proportion of working time and the Shadow Wage Rate Factor (SWR), it is calculated and is shown in Table K.1.8.

Table K.1.8 Crew Cost

Unit: US $ / hr.

	Motor Cycle	Cars	Pickups	Minibuses	Buses	2-3 axle trucks	4 axle trucks
No of Drivers	0.25	0.25	0.75	1	1	1	1
Average monthly wage rate	150	200	150	150	150	150	150
Average hourly rates for Driver	0.192	0.256	0.577	0.769	0.769	0.769	0.769
SWF Semi-Skilled	1	1	1	1	1	1	1
Economic Driver Costs	0.192	0.256	0.577	0.769	0.769	0.769	0.769
No of Conductors	0	0	0	1	1	1	1
Average hourly wage rate	75	100	100	75	75	75	75
Driver Costs	0	0	0	0.385	0.385	0.385	0.385
SWF Semi-Skilled	0.48	0.48	0.48	0.48	0.48	0.48	0.48
Economic Driver Costs	0.0	0.0	0.0	0.185	0.185	0.185	0.185
Total Economic Cost	0.192	0.256	0.577	0.954	0.954	0.954	0.954

1.3.6 Vehicle Utilization and Depreciation

The depreciation cost can be expressed as a percent of the new vehicle cost and is given by the followings:

Cost per 1000 veh-km = DEP / New Vehicle Prices

A vehicle is a medium-term capital asset. Its purchase costs represents an investment which yields services over several years. The market value of the asset declines with both the passage of time and with the amount and type of usage.

It is this loss of market value that represents vehicle depreciation. The vehicle depreciation per km is a function of the average annual depreciation (ADEP) and annual utilization (AKM).

Table K.1.9 Vehicle Characteristics

Type	Abbreviation	Fuel Type	Number of Axles	Number of Wheels	Aerodynamic Drag Coeff.	Projected Frontal Area	Operating Weight	Annual Utilization	Service Life	Houre Worked	Occupancy
Motor Cycle	MC	P	2	2	0.70	0.8	0.2	7,200	8	400	2.5
Moto-Dop	MD	P	2	2	0.70	0.8	0.2	15,000	8	400	3.5
Moto-Rumok	MR	P	2	4	0.70	0.8	0.4	15,000	8	400	20.0
Passenger Car	PC	P	2	4	0.42	1.9	1.2	25,000	12.5	550	2.5
Van/Pickup	VA	P	2	4	0.50	2.0	1.5	47,500	12.5	1300	2.5
Light Truck	LT	D	2	4	0.55	4.0	2.0	32,500	12.5	1300	3.1
Medium Truck	MT	D	2	6	0.70	8.5	9.0	52,500	12.5	1200	3.1
Heavy Truck	HT	D	3	10	0.80	9.0	11.0	53,800	12.5	2050	3.1
Light Bus	LB	D	2	4	0.50	4.0	2.5	39,000	12.5	750	15.0
Heavy Bus	HB	D	2	6	0.55	5.0	6.0	65,000	12.5	1750	30.0

Notes: Above figures are set up on the basis of "Ho Chin Minh City To Phnom Penh Highway Improvement Project, Economic Evaluation", HDM 4 Volume 5 " A Guide to Calibration and Adaptation" Appendix B Parameter values used in HDM studies, and Field survey made in this study.

DEP = ADEP / AKM

Where: ADEP: Average annual depreciation, expressed as percentage of the average new vehicle cost, given by;

ADEP = (1/LIFE) * 100

LIFE is the average vehicle service life

AKM: Average number of kilometers driven per vehicle per year

For vehicle utilization, the following method can be used:

- Constant annual kilometrage method;
- Constant annual hourly utilization method; or
- Adjusted utilization method

In this study, the following annual kilometers driven and hours driven are used as shown in Table K.1.9.

1.3.7 Interest Rate

A rate of 12 % per year is applied in this study.

1.4 Time Value

1.4.1 Passenger Time Value

There are a number of available methods for assessing the value of passenger time savings. For this analysis it is chosen different measure of time value for motor cycles, car and pickups, and trucks and buses. For cars and pickups, it was chosen average earning of top decile of household income for car drivers and passengers. This takes into account the generally higher time value levels required for car ownership. For motor cycles, it was chosen average earning of 7^{th} to 9^{th} decile of the household income. For trucks and buses average earnings throughout Cambodia has been used.

As the passenger time savings are a non-tradable goods it was applied the standards conversion factor. This represents the real value of the real of time savings, including factors to account market distortions and scarcity of foreign exchange.

Table K.1.10 Average Hourly Income

		Cars & Pickups	M/Cycles	Trucks & Buses
Household Income	Riel	1,384,860	544,330	465,407
Monthly Working Hours	Hr.	192	192	192
Hourly Income	Riel/Hr.	7,213	2,835	2,424
No. of Household Member	Person	5.2	5.2	5.2
Hourly Income/Capita	Riel/Hr./Person	1,387	545	466
Hourly Income/Capita	US$/Hr./Person	0.348	0.137	0.117

Table K.1.11 Composition of Trip Purpose

Purpose	Composition
To Home	0.215
To Work	0.193
To School	0.077
Shop	0.126
Business	0.310
Private	0.079
Total	1.000

Source: Traffic Survey made in this study

Table K.1.12 Average Value of Time Calculation

	M/Cycles	Cars	Pickups	Mini-buses	Buses	2-3 axle Trucks	4 axles Trucks	Articulated
Time Value per Hour	0.137	0.348	0.348	0.117	0.117	0.117	0.117	0.117
Proportion of Trips for Work	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64
Value of Work Time per Hour	0.088	0.223	0.223	0.075	0.075	0.075	0.075	0.075
Proportion of Trips for Non Work	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36
Value of Non Work Time per Hour	0.049	0.125	0.125	0.042	0.042	0.042	0.042	0.042
Standard Conversion Factor	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
Economic Value of Time	0.063	0.160	0.160	0.054	0.054	0.054	0.054	0.054

(3) Vehicle Occupancy

The other determinant of total travel time savings is number of passengers in each vehicle. For this analysis, it is estimated from the traffic survey conducted in this study as shown in Table K.1.13.

Table K.1.13 Vehicle Occupancy

	M/Cycles	Cars	Pickups	Mini-buses	Buses	2-3 axle Trucks	4 axles Trucks	Articulated
No. of Passengers	2.54	3.,11	3.11	10.02	15.85	2.35	2.35	2.14

Source: Traffic Survey Conducted in this study

Table K.1. 1 4 Time Value by Types of Vehicle and by Years

	M/Cycle	Light Vehicle	Heavy Vehicle	Bicycle
2002	0.160	0.499	0.269	0.054
2005	0.179	0.558	0.301	0.060
2010	0.213	0.663	0.358	0.072
2020	0.258	0.801	0.432	0.087

1.4.2 Cargo Time value

The cargo time value is calculated assuming an average value of US $ 1,000 general cargo carried by truck and an interest rate of 12 % per year, the hourly cost of delaying cargo would be about US $ 0.014. This figure applies to average load carried by each vehicle type.

1.5 Summary of VOC and Time Cost

Tables K.1.15, K.1.16 and K.1.17 summarize the VOC.

Table K.1.15 Vehicle Operating Cost by Vehicle Types, 2002 Prices

		Motor Cycles	Cars	Pickups	Minibus	Buses	2-3 axle trucks	4 axle trucks	Articulated trucks
Time Related VOC ($ / Year)	Crew cost	78.0	143.0	469.2	1,162.2	1,694.9	1,162.2	1,985.4	1,985.4
	Maintenance Cost	3.3	28.9	28.9	46.2	89.7	89.7	89.7	89.7
	Insurance Cost	114	616	528	616	572	528	352	352
	Depreciation Cost	23	526	361	746	1,964	825	1,121	1,229
	Sub-Total (S/Year	218	1,313	1,387	2,571	4,321	2,605	3,548	3,656
	Overhead Cost	22	131	139	257	432	260	355	366
	Total ($/Year)	240	1,445	1,526	2,828	4,753	2,865	3,903	4,022
	$ / Hour	0.027	0.165	0.174	0.323	0.543	0.327	0.446	0.459
Distance Related VOC	Fuel Cost	61.7	1,080.5	1,520.8	1,389.2	6,262.2	2,027.8	7,693.6	7,693.6
	Oil Cost	9.7	24.3	48.6	48.6	425.3	151.2	647.8	647.8
	Tire Cost	8.2	42.4	62.6	63.5	1,030.8	187.8	1,962.0	1,962.0
	Maintenance Cost	6.8	166.9	114.7	236.9	623.5	261.9	355.8	390.1
	Depreciation Cost	42.1	976.1	670.7	1,386.0	3,647.5	1,532.0	2,081.3	2,282.3
	Sub-Total	128.5	2,290.2	2,417.4	3,124.2	11,989.3	4,160.7	12,740.5	12,975.8
	Overhead Cost	12.9	229.0	241.7	312.4	1,198.9	416.1	1,274.1	1,297.6
	Total	141.4	2,519.2	2,659.1	3,436.6	13,188.2	4,576.8	14,014.6	14,273.4
	$ / 000km,	14.1	100.8	88.6	114.6	188.4	114.4	163.0	166.0

Table K.1.16 Unit Cost of Vehicle Operating Cost by Vehicle Types, 2002 Prices

	Motor Cycles	Cars	Pickups	Minibus	Buses	2-3 axle trucks	4 axle trucks	Articulated trucks
Representative Vehicle	Honda 100	Toyota Corolla	Toyota Hilux	Toyota Hiace		Hyudai	Hino 8 ton	Benz 2024
New Vehicle Prices	681	20,023	13,758	23,692	62,350	31,425	49,810	54,620
Service Life (yrs)	10	12	12	10	10	12	14	14
Hours Driven per Year	400	550	1,200	1,200	1,750	1,200	2,050	2,050
Kilometers Driven per Year	10,000	25,000	30,000	30,000	70,000	40,000	86,000	86,000
Life time Running Kilometers	100,000	300,000	360,000	300,000	700,000	480,000	1,204,000	1,204,000
Tire Cost	16.3	67.9	104.3	84.7	736.3	234.7	1,140.7	1,140.7
Running Kilometers	20,000	40,000	50,000	40,000	50,000	50,000	50,000	50,000
Tire Cost per 1000 Kilometer	0.82	1.70	2.09	2.12	14.73	4.69	22.81	22.81
Fuel Type Used	Petrol	Petrol	Diesel	Petrol	Diesel	Diesel	Diesel	Diesel
Fuel Costs ($/L)	0.3087	0.3087	0.2982	0.3087	0.2982	0.2982	0.2982	0.2982
Fuel Consupmtion Rate (l/Km)	0.02	0.14	0.17	0.15	0.3	0.17	0.3	0.3
Oil Costs	4.86	9.72	12.15	12.15	48.6	34.02	75.33	75.33
Distance between Oil Changes	5000	10000	7500	7500	8000	9000	10000	10000
Annual Maintenance Cost- Spare Parts	6.8	166.9	114.7	236.9	623.5	261.9	355.8	390.1
Annual Maintenance Cost- Labour	3.3	28.9	28.9	46.2	89.7	89.7	89.7	89.7
Insurance Cost per year	114	616	528	616	572	528	352	352
Crew Cost	78	143	469	1,162	1,695	1,162	1,985	1,985
Relicted Value	34.1	2,002.3	1,375.8	2,369.2	6,235.0	3,142.5	4,981.0	5,462.0
Time Related Depreciation	35%	35%	35%	35%	35%	35%	35%	35%
Distance Related Depreciation	65%	65%	65%	65%	65%	65%	65%	65%
Overhead Cos t(%)	0	0	10	10	10	10	10	10

Table K.1.17 Vehicle Operating Cost by Roughness Index, 2002 Prices

Roughness	2	3	4	5	6	7	8	9	10
Motor Cycles	14.1	14.2	14.5	14.8	15.1	15.4	16.0	16.7	17.5
Cars	100.8	101.0	103.3	105.5	107.8	110.1	113.9	119.3	124.7
2-3 axle trucks	114.4	114.6	117.7	120.8	124.0	127.1	130.2	133.4	138.7
4axle trucks	163.0	163.0	171.4	179.9	188.3	196.8	207.4	220.0	232.7
Buses	188.4	188.4	197.8	207.1	216.5	225.9	235.2	246.4	259.4

K-2. Forecasted Traffic Volume, Travel Time and Travel Kilometers on the Project Road

Table K.2.1 Forecasted Traffic Volume. Travel Time and Travel Kilometrs on the Project Road in 2005 (With Project)

No	Link No	Length	Ave.Speed	Daily Traffic Volume					Travel Time						Travel Kilometer				
				M/Cycle	Car	Heavy Veh	Bycycle	Total	Travel Tim	M/Cycle	Car	Heavy Veh	Bycycle	Total	M/Cycle	Car	Heavy Veh	Bycycle	Total
1	138	1.20	39.9	17,188	14,042	4,490	326	36,046	1.80	31,016	25,339	8,102	588	65,045	20,626	16,850	5,388	391	43,255
2	450	2.20	39.9	17,188	14,042	4,490	326	36,046	3.31	56,863	46,455	14,854	1,078	119,250	37,814	30,892	9,878	717	79,301
3	139	1.10	50.0	5,464	6,912	3,634	90	16,100	1.32	7,212	9,124	4,797	119	21,252	6,010	7,603	3,997	99	17,710
4	453	2.30	50.0	5,464	6,912	3,634	90	16,100	2.76	15,081	19,077	10,030	248	44,436	12,567	15,898	8,358	207	37,030
5	140	2.40	50.0	3,950	5,284	3,072	76	12,382	2.88	11,376	15,218	8,847	219	35,660	9,480	12,682	7,373	182	29,717
6	454	2.50	50.0	3,190	4,234	2,644	70	10,138	3.00	9,570	12,702	7,932	210	30,414	7,975	10,585	6,610	175	25,345
7	455	1.90	50.0	2,894	3,908	2,560	72	9,434	2.28	6,598	8,910	5,837	164	21,510	5,499	7,425	4,864	137	17,925
8	141	5.20	60.0	1,808	2,698	1,868	118	6,492	5.20	9,402	14,030	9,714	614	33,758	9,402	14,030	9,714	614	33,758
9	456	3.69	60.0	1,614	2,508	1,752	138	6,012	3.69	5,956	9,255	6,465	509	22,184	5,956	9,255	6,465	509	22,184
10	142	1.88	60.0	1,614	2,508	1,752	138	6,012	1.88	3,034	4,715	3,294	259	11,303	3,034	4,715	3,294	259	11,303
11	457	5.37	60.0	1,564	2,430	1,712	148	5,854	5.37	8,399	13,049	9,193	795	31,436	8,399	13,049	9,193	795	31,436
12	143	5.30	60.0	1,470	2,256	1,582	168	5,476	5.30	7,791	11,957	8,385	890	29,023	7,791	11,957	8,385	890	29,023
13	458	3.58	60.0	1,414	2,152	1,496	192	5,254	3.58	5,062	7,704	5,356	687	18,809	5,062	7,704	5,356	687	18,809
14	144	6.57	60.0	1,414	2,152	1,496	192	5,254	6.57	9,290	14,139	9,829	1,261	34,519	9,290	14,139	9,829	1,261	34,519
15	459	1.06	60.0	1,396	2,120	1,464	226	5,206	1.06	1,480	2,247	1,552	240	5,518	1,480	2,247	1,552	240	5,518
16	145	2.53	60.0	1,396	2,120	1,464	226	5,206	2.53	3,532	5,364	3,704	572	13,171	3,532	5,364	3,704	572	13,171
17	146	1.87	60.0	1,396	2,120	1,464	226	5,206	1.87	2,611	3,964	2,738	423	9,735	2,611	3,964	2,738	423	9,735
18	460	2.90	60.0	1,390	2,102	1,448	268	5,208	2.90	4,031	6,096	4,199	777	15,103	4,031	6,096	4,199	777	15,103
		53.55		71,814	80,500	42,022	3,090	197,426		198,302	229,344	124,827	9,654	562,127	160,557	194,454	110,896	8,936	474,843

Table K.2.2 Forecasted Traffic Volume. Travel Time and Travel Kilometrs on the Project Road in 2005 (Without Project)

No	Link No	Length	Ave.Speed	Daily Traffic Volume					Travel Time						Travel Kilometer				
				M/Cycle	Car	Heavy Veh	Bycycle	Total	Travel Tim	M/Cycle	Car	Heavy Veh	Bycycle	Total	M/Cycle	Car	Heavy Veh	Bycycle	Total
1	138	1.20	39.9	17,150	13,982	4,490	326	35,948	1.80	30,947	25,231	8,102	588	64,870	20,580	16,778	5,388	391	43,138
2	450	2.20	35.2	17,150	13,982	4,490	326	35,948	3.75	64,313	52,433	16,838	1,223	134,805	37,730	30,760	9,878	717	79,086
3	139	1.10	38.7	5,426	6,852	3,634	90	16,002	1.71	9,254	11,686	6,198	153	27,292	5,969	7,537	3,997	99	17,602
4	453	2.30	38.7	5,426	6,852	3,634	90	16,002	3.57	19,349	24,433	12,958	321	57,065	12,480	15,760	8,358	207	36,805
5	140	2.40	39.8	3,912	5,224	3,072	76	12,284	3.62	14,154	18,901	11,115	275	44,448	9,389	12,538	7,373	182	29,482
6	454	2.50	40.0	3,152	4,174	2,644	70	10,040	3.75	11,820	15,653	9,915	263	37,654	7,880	10,435	6,610	175	25,100
7	455	1.90	40.0	2,856	3,848	2,560	72	9,336	2.85	8,140	10,967	7,296	205	26,610	5,426	7,311	4,864	137	17,738
8	141	5.20	30.0	1,770	2,638	1,868	118	6,394	10.40	18,408	27,435	19,427	1,227	66,508	9,204	13,718	9,714	614	33,249
9	456	3.69	30.0	1,576	2,448	1,752	138	5,914	7.38	11,631	18,066	12,930	1,018	43,653	5,815	9,033	6,465	509	21,823
10	142	1.88	30.0	1,576	2,448	1,752	138	5,914	3.76	5,926	9,204	6,588	519	22,240	2,963	4,602	3,294	259	11,118
11	457	5.37	30.0	1,518	2,366	1,712	148	5,744	10.74	16,303	25,411	18,387	1,590	61,701	8,152	12,705	9,193	795	30,845
12	143	5.30	30.0	1,424	2,192	1,582	168	5,366	10.60	15,094	23,235	16,769	1,781	56,890	7,547	11,618	8,385	890	28,440
13	458	3.58	30.0	1,368	2,088	1,496	192	5,144	7.16	9,795	14,950	10,711	1,375	36,838	4,897	7,475	5,356	687	18,416
14	144	6.57	30.0	1,368	2,088	1,496	192	5,144	13.14	17,976	27,436	19,657	2,523	67,605	8,988	13,718	9,829	1,261	33,796
15	459	1.06	30.0	1,350	2,056	1,464	226	5,096	2.12	2,862	4,359	3,104	479	10,806	1,431	2,179	1,552	240	5,402
16	145	2.53	30.0	1,350	2,056	1,464	226	5,096	5.06	6,831	10,403	7,408	1,144	25,791	3,416	5,202	3,704	572	12,893
17	146	1.87	30.0	1,350	2,056	1,464	226	5,096	3.74	5,049	7,689	5,475	845	19,063	2,525	3,845	2,738	423	9,530
18	460	2.90	30.0	1,344	2,038	1,448	268	5,098	5.80	7,795	11,820	8,398	1,554	29,574	3,898	5,910	4,199	777	14,784
		53.55		71,066	79,388	42,022	3,090	195,566	100.94	275,646	339,313	201,276	17,083	833,414	158,289	191,125	110,896	8,936	469,245

Table K.2.3 Forecasted Traffic Volume. Travel Time and Travel Kilometrs on the Project Road in 2010 (With Project)

No	Link No	Length	Ave.Speed	Daily Traffic Volume					Travel Time						Travel Kilometer				
				M/Cycle	Car	Heavy Veh	Bycycle	Total	Travel Tim	M/Cycle	Car	Heavy Veh	Bycycle	Total	M/Cycle	Car	Heavy Veh	Bycycle	Total
1	138	1.20	39.9	22,787	20,626	6,528	486	50,427	1.80	41,119	37,220	11,780	877	90,996	27,344	24,751	7,834	583	60,512
2	450	2.20	39.9	22,787	20,626	6,528	486	50,427	3.31	75,386	68,236	21,596	1,608	166,826	50,131	45,377	14,362	1,069	110,939
3	139	1.10	50.0	7,207	10,438	5,344	168	23,157	1.32	9,513	13,778	7,054	222	30,567	7,928	11,482	5,878	185	25,473
4	453	2.30	50.0	7,207	10,438	5,344	168	23,157	2.76	19,891	28,809	14,749	464	63,913	16,576	24,007	12,291	386	53,261
5	140	2.40	50.0	5,248	8,144	4,576	154	18,122	2.88	15,114	23,455	13,179	444	52,191	12,595	19,546	10,982	370	43,493
6	454	2.50	50.0	4,242	6,656	3,988	150	15,036	3.00	12,726	19,968	11,964	450	45,108	10,605	16,640	9,970	375	37,590
7	455	1.90	50.0	3,850	6,138	3,872	152	14,012	2.28	8,778	13,995	8,828	347	31,947	7,315	11,662	7,357	289	26,623
8	141	5.20	60.0	2,458	4,354	2,848	222	9,882	5.20	12,782	22,641	14,810	1,154	51,386	12,782	22,641	14,810	1,154	51,386
9	456	3.69	60.0	2,196	4,040	2,652	248	9,136	3.69	8,103	14,908	9,786	915	33,712	8,103	14,908	9,786	915	33,712
10	142	1.88	60.0	2,196	4,040	2,652	248	9,136	1.88	4,128	7,595	4,986	466	17,176	4,128	7,595	4,986	466	17,176
11	457	5.37	60.0	2,120	3,888	2,574	256	8,838	5.37	11,384	20,879	13,822	1,375	47,460	11,384	20,879	13,822	1,375	47,460
12	143	5.30	60.0	1,994	3,602	2,388	288	8,272	5.30	10,568	19,091	12,656	1,526	43,842	10,568	19,091	12,656	1,526	43,842
13	458	3.58	60.0	1,923	3,428	2,242	324	7,917	3.58	6,884	12,272	8,026	1,160	28,343	6,884	12,272	8,026	1,160	28,343
14	144	6.57	60.0	1,923	3,428	2,242	324	7,917	6.57	12,634	22,522	14,730	2,129	52,015	12,634	22,522	14,730	2,129	52,015
15	459	1.06	60.0	1,887	3,342	2,180	366	7,775	1.06	2,000	3,543	2,311	388	8,242	2,000	3,543	2,311	388	8,242
16	145	2.53	60.0	1,887	3,342	2,180	366	7,775	2.53	4,774	8,455	5,515	926	19,671	4,774	8,455	5,515	926	19,671
17	146	1.87	60.0	1,887	3,342	2,180	366	7,775	1.87	3,529	6,250	4,077	684	14,539	3,529	6,250	4,077	684	14,539
18	460	2.90	60.0	1,861	3,280	2,148	420	7,709	2.90	5,397	9,512	6,229	1,218	22,356	5,397	9,512	6,229	1,218	22,356
		53.55		95,660	123,152	62,466	5,192	286,470		264,712	353,127	186,099	16,352	820,290	214,679	301,132	165,622	15,199	696,632

Travel Cost

Table K.2.4 Forecasted Traffic Volume. Travel Time and Travel Kilometrs on the Project Road in 2010 (Without Project)

No	Link No	Length	Ave.Speed	Daily Traffic Volume					Travel Time						Travel Kilometer				
				M/Cycle	Car	Heavy Veh	Bycycle	Total	Travel Tim	M/Cycle	Car	Heavy Veh	Bycycle	Total	M/Cycle	Car	Heavy Veh	Bycycle	Total
1	138	1.20	39.9	22,733	20,478	6,498	486	50,195	1.80	41,022	36,953	11,726	877	90,577	27,280	24,574	7,798	583	60,234
2	450	2.20	35.2	22,733	20,478	6,498	486	50,195	3.75	85,249	76,793	24,368	1,823	188,231	50,013	45,052	14,296	1,069	110,429
3	139	1.10	38.7	7,153	10,290	5,314	168	22,925	1.71	12,199	17,549	9,063	287	39,097	7,868	11,319	5,845	185	25,218
4	453	2.30	38.7	7,153	10,290	5,314	168	22,925	3.57	25,507	36,693	18,949	599	81,748	16,452	23,667	12,222	386	52,728
5	140	2.40	39.8	5,194	7,996	4,546	154	17,890	3.62	18,792	28,930	16,448	557	64,728	12,466	19,190	10,910	370	42,936
6	454	2.50	40.0	4,188	6,508	3,958	150	14,804	3.75	15,705	24,405	14,843	563	55,515	10,470	16,270	9,895	375	37,010
7	455	1.90	40.0	3,796	5,986	3,842	152	13,776	2.85	10,819	17,060	10,950	433	39,262	7,212	11,373	7,300	289	26,174
8	141	5.20	30.0	2,348	4,158	2,818	222	9,546	10.40	24,419	43,243	29,307	2,309	99,278	12,210	21,622	14,654	1,154	49,639
9	456	3.69	30.0	2,078	3,828	2,622	248	8,776	7.38	15,336	28,251	19,350	1,830	64,767	7,668	14,125	9,675	915	32,383
10	142	1.88	30.0	2,078	3,828	2,622	248	8,776	3.76	7,813	14,393	9,859	932	32,998	3,907	7,197	4,929	466	16,499
11	457	5.37	30.0	2,002	3,676	2,544	256	8,478	10.74	21,501	39,480	27,323	2,749	91,054	10,751	19,740	13,661	1,375	45,527
12	143	5.30	30.0	1,868	3,370	2,358	288	7,884	10.60	19,801	35,722	24,995	3,053	83,570	9,900	17,861	12,497	1,526	41,785
13	458	3.58	30.0	1,797	3,196	2,212	324	7,529	7.16	12,867	22,883	15,838	2,320	53,908	6,433	11,442	7,919	1,160	26,954
14	144	6.57	30.0	1,797	3,196	2,212	324	7,529	13.14	23,613	41,995	29,066	4,257	98,931	11,806	20,998	14,533	2,129	49,466
15	459	1.06	30.0	1,761	3,110	2,150	366	7,387	2.12	3,733	6,593	4,558	776	15,660	1,867	3,297	2,279	388	7,830
16	145	2.53	30.0	1,761	3,110	2,150	366	7,387	5.06	8,911	15,737	10,879	1,852	37,378	4,455	7,868	5,440	926	18,689
17	146	1.87	30.0	1,761	3,110	2,150	366	7,387	3.74	6,586	11,631	8,041	1,369	27,627	3,293	5,816	4,021	684	13,814
18	460	2.90	30.0	1,743	3,064	2,118	420	7,345	5.80	10,109	17,771	12,284	2,436	42,601	5,055	8,886	6,142	1,218	21,301
		53.55		93,944	119,672	61,926	5,192	280,734		363,981	516,083	297,845	29,022	1,206,931	209,105	290,295	164,016	15,199	678,615

Table K.2.5 Forecasted Traffic Volume. Travel Time and Travel Kilometrs on the Project Road in 2015 (With Project)

No	Link No	Length	Ave.Speed	Daily Traffic Volume					Travel Time						Travel Kilometer				
				M/Cycle	Car	Heavy Veh	Bycycle	Total	ravel Tim	M/Cycle	Car	Heavy Veh	Bycycle	Total	M/Cycle	Car	Heavy Veh	Bycycle	Total
1	138	1.20	39.9	28,211	27,195	8,108	626	64,140	1.80	50,907	49,074	14,631	1,130	115,741	33,853	32,634	9,730	751	76,968
2	450	2.20	39.9	28,211	27,195	8,108	626	64,140	3.31	93,330	89,968	26,823	2,071	212,192	62,064	59,829	17,838	1,377	141,108
3	139	1.10	50.0	10,037	12,839	6,464	306	29,646	1.32	13,249	16,947	8,532	404	39,133	11,041	14,123	7,110	337	32,611
4	453	2.30	50.0	10,037	12,839	6,464	306	29,646	2.76	27,702	35,436	17,841	845	81,823	23,085	29,530	14,867	704	68,186
5	140	2.40	50.0	6,872	10,790	5,832	274	23,768	2.88	19,791	31,075	16,796	789	68,452	16,493	25,896	13,997	658	57,043
6	454	2.50	50.0	5,526	8,706	5,036	264	19,532	3.00	16,578	26,118	15,108	792	58,596	13,815	21,765	12,590	660	48,830
7	455	1.90	50.0	5,004	8,026	4,890	262	18,182	2.28	11,409	18,299	11,149	597	41,455	9,508	15,249	9,291	498	34,546
8	141	5.20	60.0	3,142	5,578	3,548	358	12,626	5.20	16,338	29,006	18,450	1,862	65,655	16,338	29,006	18,450	1,862	65,655
9	456	3.69	60.0	2,794	5,170	3,298	400	11,662	3.69	10,310	19,077	12,170	1,476	43,033	10,310	19,077	12,170	1,476	43,033
10	142	1.88	60.0	2,794	5,170	3,298	400	11,662	1.88	5,253	9,720	6,200	752	21,925	5,253	9,720	6,200	752	21,925
11	457	5.37	60.0	2,698	4,984	3,212	408	11,302	5.37	14,488	26,764	17,248	2,191	60,692	14,488	26,764	17,248	2,191	60,692
12	143	5.30	60.0	2,538	4,624	2,982	442	10,586	5.30	13,451	24,507	15,805	2,343	56,106	13,451	24,507	15,805	2,343	56,106
13	458	3.58	60.0	2,444	4,408	2,812	488	10,152	3.58	8,750	15,781	10,067	1,747	36,344	8,750	15,781	10,067	1,747	36,344
14	144	6.57	60.0	2,444	4,408	2,812	488	10,152	6.57	16,057	28,961	18,475	3,206	66,699	16,057	28,961	18,475	3,206	66,699
15	459	1.06	60.0	2,404	4,310	2,742	542	9,998	1.06	2,548	4,569	2,907	575	10,598	2,548	4,569	2,907	575	10,598
16	145	2.53	60.0	2,404	4,310	2,742	542	9,998	2.53	6,082	10,904	6,937	1,371	25,295	6,082	10,904	6,937	1,371	25,295
17	146	1.87	60.0	2,404	4,310	2,742	542	9,998	1.87	4,495	8,060	5,128	1,014	18,696	4,495	8,060	5,128	1,014	18,696
18	460	2.90	60.0	2,384	4,246	2,710	608	9,948	2.90	6,914	12,313	7,859	1,763	28,849	6,914	12,313	7,859	1,763	28,849
		53.55	56.8	122,348	159,108	77,800	7,882	367,138		337,653	456,579	232,126	24,926	1,051,283	274,545	388,687	206,667	23,283	893,183

Table K.2.6 Forecasted Traffic Volume. Travel Time and Travel Kilometrs on the Project Road in 2015 (Without Project)

No	Link No	Length	Ave.Speed	Daily Traffic Volume					Travel Time						Travel Kilometer				
				M/Cycle	Car	Heavy Veh	Bycycle	Total	ravel Tim	M/Cycle	Car	Heavy Veh	Bycycle	Total	M/Cycle	Car	Heavy Veh	Bycycle	Total
1	138	1.20	39.1	28,071	26,975	8,066	626	63,726	1.84	51,691	49,673	14,853	1,153	117,369	33,685	32,370	9,679	751	76,486
2	450	2.20	31.7	28,071	26,975	8,066	626	63,726	4.16	116,889	112,325	33,587	2,607	265,407	61,756	59,345	17,745	1,377	140,224
3	139	1.10	36.7	10,013	12,695	6,422	306	29,424	1.80	18,007	22,830	11,549	550	52,937	11,014	13,965	7,064	337	32,380
4	453	2.30	36.7	10,013	12,695	6,422	306	29,424	3.76	37,651	47,736	24,148	1,151	110,686	23,030	29,199	14,771	704	67,703
5	140	2.40	38.6	6,802	10,620	5,794	274	23,478	3.73	25,375	39,619	21,615	1,022	87,631	16,325	25,488	13,906	658	56,376
6	454	2.50	39.6	5,456	8,536	4,998	264	19,242	3.79	20,667	32,333	18,932	1,000	72,932	13,640	21,340	12,495	660	48,135
7	455	1.90	39.8	4,926	7,840	4,852	262	17,868	2.86	14,110	22,456	13,898	750	51,214	9,359	14,896	9,219	498	33,972
8	141	5.20	29.8	3,004	5,332	3,510	358	12,192	10.47	31,451	55,825	36,749	3,748	127,773	15,621	27,726	18,252	1,862	63,461
9	456	3.69	29.9	2,644	4,908	3,260	400	11,200	7.40	19,578	36,342	24,139	2,962	83,021	9,756	18,111	12,029	1,476	41,372
10	142	1.88	30.0	2,380	4,342	2,944	400	10,096	3.76	8,949	16,326	11,069	1,504	37,848	4,474	8,163	5,535	752	18,924
11	457	5.37	30.0	2,286	4,126	2,774	408	9,662	10.74	24,552	44,313	29,793	4,382	103,040	12,276	22,157	14,896	2,191	51,520
12	143	5.30	30.0	2,246	4,028	2,704	442	9,508	10.60	23,808	42,697	28,662	4,685	99,852	11,904	21,348	14,331	2,343	49,926
13	458	3.58	30.0	2,246	4,028	2,704	488	9,508	7.16	16,081	28,840	19,361	3,494	67,777	8,041	14,420	9,680	1,747	33,888
14	144	6.57	29.9	2,644	4,908	3,260	488	11,200	13.18	34,858	64,707	42,980	6,434	148,979	17,371	32,246	21,418	3,206	74,241
15	459	1.06	30.0	2,548	4,722	3,174	542	10,840	2.12	5,402	10,011	6,729	1,149	23,290	2,701	5,005	3,364	575	11,645
16	145	2.53	30.0	2,286	4,126	2,774	542	9,662	5.06	11,567	20,878	14,036	2,743	49,224	5,784	10,439	7,018	1,371	24,612
17	146	1.87	30.0	2,246	4,028	2,704	542	9,508	3.74	8,400	15,065	10,113	2,027	35,605	4,200	7,532	5,056	1,014	17,802
18	460	2.90	30.0	2,234	3,980	2,672	608	9,482	5.80	12,957	23,084	15,498	3,526	55,065	6,479	11,542	7,749	1,763	27,533
		53.55	31.8	120,116	154,864	77,100	7,666	359,746		481,992	685,059	377,711	44,887	1,589,650	267,416	375,291	204,209	23,283	870,199