

APPENDICIES FOR CHAPTER 8

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CONSTRUCTION COST
(HIGHWAY - 1)

unit : thousand Rs.

item	without taxes & duties	with taxes & duties
[local cost]		
labor	5,711.633	
material	10,905.175	
other	5,623.179	
land	18,900.000	
subtotal	41,139.987	41,139.987
import taxes & duties		7,710.705
taxes on local materials		763.362
total local costs		49,614.054
[foreign cost]		
foreign cost	6,823.632	
freight on import	341.182	
total foreign costs	7,164.814	7,164.814
TOTAL	48,304.801	56,778.868
total length in km	1.000	1.000
cost per km	48,304.801	56,778.868

COST TABULATION (HIGH WAY-1) 6 lane

item	unit cost Rs	unit	quantity	costs without taxes & duties	foreign costs		local costs		labor		material		other		land Rs	import taxes & duties		taxes 12.5% on lcl mtl		freight on import	
					%	Rs	%	Rs	%	Rs	%	Rs	%	Rs		%	Rs	%	Rs		%
clearing & connection earthwork	6 39	m ² m ³	45,000 45,000	276,000 1,755,000	27 27	72,900 473,850	73 73	197,100 1,281,150	20 20	39,420 256,230	55 55	108,405 704,633	25 25	49,275 320,288		113 113	82,377 535,451	56 56	7,588 49,324	5 5	3,645 23,693
sub base course 30cm	244	m ³	10,500	2,562,000	27	691,740	73	1,870,260	20	374,052	55	1,028,643	25	457,565		113	781,666	56	72,005	5	34,587
agg. base course 30cm	287	m ³	10,500	3,013,500	27	813,645	73	2,199,855	20	439,971	55	1,209,920	25	549,964		113	919,419	56	84,694	5	40,682
prime coat	13.5	m ²	35,000	472,500	27	127,575	73	344,925	20	68,985	55	189,709	25	86,231		113	144,160	56	13,280	5	6,379
base course 10cm	1.185	m ³	3,500	4,147,500	27	1,119,825	73	3,027,675	20	605,535	55	1,665,221	25	756,919		113	1,265,402	56	116,565	5	55,991
wearing course 5cm	1.427	m ³	1,750	2,497,250	27	674,258	73	1,822,993	20	364,599	55	1,002,646	25	455,748		113	761,911	56	70,185	5	33,713
pedestrians						0.000	0.000	0.000		0.000	0.000	0.000	0.000	0.000			0.000	0.000	0.000		0.000
sub base course 10cm	244	m ³	500	122,000	27	32,940	73	89,060	20	17,812	55	48,983	25	22,265		113	37,222	56	3,429	5	1,647
base course 10cm	287	m ³	500	143,500	27	38,745	73	104,755	20	20,951	55	57,615	25	26,189		113	43,782	56	4,033	5	1,937
surfacing 5cm	71	m ²	5,000	355,000	27	95,850	73	259,150	20	51,830	55	142,533	25	64,788		113	108,311	56	9,977	5	4,793
structures	600,000	each	3	1,800,000	27	486,000	73	1,314,000	20	262,800	55	722,700	25	328,500		113	549,180	56	50,589	5	24,300
drainage	1,500,000	km	1	1,500,000	27	405,000	73	1,095,000	20	219,000	55	602,250	25	273,750		113	457,650	56	42,158	5	20,250
miscellaneous						0.000	0.000	0.000		0.000	0.000	0.000	0.000	0.000			0.000	0.000	0.000		0.000
lightings	1,160,000	km	1	1,160,000	27	313,200	73	846,800	20	169,360	55	465,740	25	211,700		113	353,916	56	32,602	5	15,660
signals	300,000	each	3	900,000	27	243,000	73	657,000	20	131,400	55	361,350	25	164,250		113	274,590	56	25,295	5	12,150
signs & markings	680,000	km	1	680,000	27	183,600	73	496,400	20	99,280	55	273,020	25	124,100		113	207,468	56	19,111	5	9,180
pedestrian Xings	891,000	each	1	891,000	27	240,570	73	650,430	20	130,086	55	357,737	25	162,608		113	271,844	56	25,042	5	12,029
util. relocation	1,300,000	km	1	1,300,000	27	486,000	73	1,314,000	20	262,800	55	722,700	25	328,500		113	549,180	56	50,589	5	24,300
total facilities & systems				24,069,250		6,498,698		17,570,553		3,514,111		9,663,804		4,392,638			7,343,528		676,466		324,935
land	400	m ²	45,000	18,000,000	0	0.000	100	18,000,000	0	0.000	0	0.000	0	0.000	18,000,000	0	0.000	0	0.000	0	0.000
engineering project admin.	10 5	% %	24,069 24,069	2,406,925 1,203,463	0 0	0.000 0.000	100 100	2,406,925 1,203,463	40 80	962,770 962,770	20 20	481,385 240,693	40 0	962,770 0.000		0 0	0.000 0.000	56 55	33,697 16,848	0 0	0.000 0.000
subtotal				45,679,638		6,498,698		39,180,940		5,439,651		10,365,881		5,355,408	18,000,000		7,343,528		727,012		324,935
contingencies	5	%		2,283,982		324,935		1,959,047		271,983		519,294		267,770	900,000		367,176		36,351		16,247
TOTAL				47,963,619		6,823,632		41,139,987		5,711,633		10,905,175		5,623,179	18,900,000		7,710,705		763,362		341,182

CONSTRUCTION COST
(HIGHWAY - 2)

unit : thousand Rs.

item	without taxes & duties	with taxes & duties
[local cost]		
labor	3,218.476	
material	6,145.011	
other	3,168.633	
land	21,000.000	
subtotal	33,532.120	33,532.120
import taxes & duties		4,344.943
taxes on local materials		430.151
total local costs		38,307.213
[foreign cost]		
foreign cost	3,845.082	
freight on import	192.254	
total foreign costs	4,037.336	4,037.336
TOTAL	37,569.456	42,344.549
total length in km	1.000	1.000
cost per km	37,569.456	42,344.549

COST TABULATION (HIGH WAY-2) 4 lane (urban)

item	unit cost Rs	unit	quantity	costs without taxes & duties	foreign costs		local costs		labor		material		other		land Rs	import taxes & duties		taxes 12.5% on incl matl		freight on import	
					%	%	%	%	%	%	%	%	%	%		%	%	%	%	%	%
cleaning & compaction earthwork	6 39	m ² m ³	25,000 25,000	150,000 975,000	27 27	40,500 263,250	73 73	109,500 711,750	20 20	21,900 142,350	55 55	60,225 391,463	25 25	27,375 177,938		113 113	45,765 297,473	56 56	4,216 27,402	5 5	2,025 13,163
sub base course 30cm reg. base course 30cm prime coat base course 10cm wearing course 5cm	244 287 13.5 1.185 1.427	m ³ m ³ m ² m ³ m ³	4,800 4,800 16,000 1,600 800	1,171,200 1,377,600 216,000 1,896,000 1,141,600	27 27 27 27 27	316,224 371,952 58,320 511,920 308,232	73 73 73 73 73	854,976 1,005,648 157,680 1,384,080 833,368	20 20 20 20 20	170,995 201,130 31,536 276,816 166,674	55 55 55 55 55	470,237 553,106 86,724 761,244 458,352	25 25 25 25 25	213,744 251,412 39,420 346,020 208,342		113 113 113 113 113	357,333 420,306 65,902 578,470 348,302	56 56 56 56 56	32,917 38,717 6,071 53,287 32,085	5 5 5 5 5	15,811 18,598 2,916 25,596 15,412
pedestrians sub base course 10cm base course 10cm surfacing 5cm	244 287 71	m ³ m ³ m ²	500 500 5,000	122,000 143,500 355,000	27 27 27	32,940 38,745 95,850	73 73 73	89,060 104,755 259,150	20 20 20	17,812 20,951 51,830	55 55 55	48,983 57,615 142,533	25 25 25	22,265 26,189 64,788		113 113 113	37,222 43,782 108,311	56 56 56	3,429 4,033 9,977	5 5 5	1,647 1,937 4,793
structures drainage	400,000 1,500,000	each km	3 1	1,200,000 1,500,000	27 27	324,000 405,000	73 73	876,000 1,095,000	20 20	175,200 219,000	55 55	481,800 602,250	25 25	219,000 273,750		113 113	366,120 457,650	56 56	33,726 42,138	5 5	16,200 20,250
miscellaneous lightings signals signs & markings pedestrian Xings util. relocation	580,000 300,000 340,000 495,000 1,000,000	km each km each km	1 3 1 1 1	580,000 900,000 340,000 495,000 1,000,000	27 27 27 27 27	156,600 243,000 91,800 133,650 270,000	73 73 73 73 73	423,400 657,000 248,200 361,350 730,000	20 20 20 20 20	84,680 131,400 49,640 72,270 146,000	55 55 55 55 55	232,870 361,350 136,510 198,743 401,500	25 25 25 25 25	105,850 164,250 62,050 90,338 182,500		113 113 113 113 113	176,938 274,590 103,734 151,025 305,100	56 56 56 56 56	16,301 25,295 9,556 13,912 28,105	5 5 5 5 5	7,830 12,150 4,590 6,683 13,500
total facilities & systems				13,562,900		3,661,983		9,900,917		1,980,183		5,445,504		2,475,229			4,138,041		381,185		183,099
land	800	m ²	25,000	20,000,000	0	0,000	20,000,000	0	0,000	0	0,000	0	0,000	0	20,000,000	0	0,000	0	0,000	0	0,000
engineering project admin.	10 5	% %	13,563 13,563	1,356,290 678,145	0 0	0,000 0,000	1,356,290 678,145	40 80	542,516 542,516	20 20	271,258 135,629	40 0	542,516 0	0	0,000	0	0,000	56 56	18,988 9,494	0 0	0,000 0,000
subtotal				35,597,335		3,661,983		31,935,352		3,065,215		5,952,391		3,017,745			4,138,041		409,667		183,099
contingencies	5	%		1,779,867		183,099		1,596,768		153,261		232,620		150,887			206,902		20,483		9,155
TOTAL				37,377,202		3,845,082		33,532,120		3,218,476		6,145,011		3,168,633			4,344,943		430,151		192,254

CONSTRUCTION COST
(HIGHWAY - 3)

unit : thousand Rs.

item	without taxes & duties	with taxes & duties
[local cost]		
labor	3,194.559	
material	6,099.345	
other	3,145.085	
land	21,000.000	
subtotal	33,438.990	33,438.990
import taxes & duties		4,312.654
taxes on local materials		426.954
total local costs		38,178.598
[foreign cost]		
foreign cost	3,816.508	
freight on import	190.825	
total foreign costs	4,007.334	4,007.334
TOTAL	37,446.323	42,185.932
total length in km	1.000	1.000
cost per km	37,446.323	42,185.932

COST TABULATION (HIGH WAY-3) 4 lane (suburban)

item	unit cost Rs	unit	quantity	costs without taxes & duties		foreign costs		local costs		labor		material		other		land Rs	import taxes & duties		taxes 12.5% on incl mtl		freight on import		
				Rs	%	Rs	%	Rs	%	Rs	%	Rs	%	Rs	%		Rs	%	Rs	%	Rs	%	Rs
clearing & connection earthwork	6 39	m ² m ³	40,000 40,000	240,000 1,560,000	27 27	64,800 421,200	0.000 0.000	175,200 1,138,800	73 73	35,040 227,760	20 20	96,360 626,340	55 55	43,800 284,700	25 25	73,224 475,956	113 113	6.745 43.844	56 56	3.240 21.060	5 5	0.000 0.000	5 5
sub base course 30cm	244	m ³	4,390	1,068,720	27	288,554	0.000	780,166	73	156,033	20	429,091	55	196,041	25	326,066	113	30.036	56	14.428	5	0.000	5
agg. base course 30cm	287	m ³	4,380	1,257,060	27	339,406	0.000	917,654	73	183,531	20	504,710	55	229,413	25	383,529	113	35.330	56	16.970	5	0.000	5
prime coat	13.5	m ²	14,600	197,100	27	53,217	0.000	143,883	73	28,777	20	79,136	55	35,971	25	60,135	113	5.539	56	2.661	5	0.000	5
base course 10cm	1.185	m ³	1,460	1,730,100	27	467,127	0.000	1,262,973	73	252,595	20	694,635	55	315,743	25	527,854	113	48.624	56	23.356	5	0.000	5
wearing course 5cm	1.427	m ³	730	1,041,710	27	281,262	0.000	760,448	73	152,090	20	418,247	55	190,112	25	317,826	113	29.277	56	14.063	5	0.000	5
shoulders						0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
sub base course 10cm	244	m ³	620	151,280	27	40,846	0.000	110,434	73	22,087	20	60,739	55	27,609	25	46,156	113	4.252	56	2.042	5	0.000	5
base course 10cm	287	m ³	620	177,940	27	48,044	0.000	129,896	73	25,979	20	71,443	55	32,474	25	54,289	113	5.001	56	2.402	5	0.000	5
surfacing 5cm	71	m ²	6,200	440,200	27	118,854	0.000	321,346	73	64,269	20	176,740	55	80,337	25	134,305	113	12.372	56	5.943	5	0.000	5
structures	400,000	each	3	1,200,000	27	324,000	0.000	876,000	73	175,200	20	481,800	55	219,000	25	366,120	113	33.726	56	16.200	5	0.000	5
drainage	1,500,000	km	1	1,500,000	27	405,000	0.000	1,095,000	73	219,000	20	602,250	55	273,750	25	457,650	113	42.158	56	20.250	5	0.000	5
miscellaneous						0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
lightings	580,000	km	1	580,000	27	156,600	0.000	423,400	73	84,680	20	232,870	55	105,850	25	176,958	113	16.301	56	7.830	5	0.000	5
signals	300,000	each	3	900,000	27	243,000	0.000	657,000	73	131,400	20	361,350	55	164,250	25	274,590	113	25.295	56	12.150	5	0.000	5
signs & markings	340,000	km	1	340,000	27	91,800	0.000	248,200	73	49,640	20	136,510	55	62,050	25	103,734	113	9.556	56	4.590	5	0.000	5
pedestrian Xings	578,000	each	1	578,000	27	156,060	0.000	421,940	73	84,388	20	232,067	55	105,485	25	176,348	113	16.245	56	7.803	5	0.000	5
util. relocation	500,000	km	1	500,000	27	135,000	0.000	365,000	73	73,000	20	200,750	55	91,250	25	152,550	113	14.053	56	6.750	5	0.000	5
total facilities & systems				13,462,110		3,634,770		9,827,340		1,965,468		5,405,037		2,456,835		4,107,290		378,353		181,738		0.000	
land	500	m ²	40,000	20,000,000	0	0.000	20,000,000	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	20,000,000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
engineering protect admin.	10 5	% %	13,462 13,462	1,346,211 673,106	0 0	0.000 0.000	1,346,211 673,106	100 100	538,484 538,484	40 80	538,484 538,484	20 20	269,242 134,621	40 20	538,484 0.000	0 0	0.000 0.000	18.847 9.423	0 0	0.000 0.000	0 0	0.000 0.000	0.000 0.000
subtotal				35,481,427		3,634,770		31,846,657		3,042,437		5,808,900		2,995,319		4,107,290		406,623		181,738		0.000	
contingencies	5	%		1,774,071		181,738		1,592,333		152,122		290,445		149,766		205,364		20,331		9,087		0.000	
TOTAL				37,255,498		3,816,508		33,438,990		3,194,559		6,099,345		3,145,085		4,312,654		426,954		190,825		0.000	

CONSTRUCTION COST
(HIGHWAY - 4)

unit : thousand Rs.

item	without taxes & duties	with taxes & duties
[local cost]		
labor	2,248.714	
material	4,293.452	
other	2,213.889	
land	12,600.000	
subtotal	21,356.055	21,356.055
import taxes & duties		3,035.764
taxes on local materials		300.542
total local costs		24,692.361
[foreign cost]		
foreign cost	2,686.517	
freight on import	134.326	
total foreign costs	2,820.843	2,820.843
TOTAL	24,176.898	27,513.203
total length in km	1.000	1.000
cost per km	24,176.898	27,513.203

COST TABULATION (HIGH WAY-4) 2 lane

item	unit cost Rs	unit	quantity	costs without taxes & duties	foreign costs		local costs		labor Rs		material Rs		other Rs		land Rs	import taxes & duties		taxes 12.5% on (cl mt)	freight on import	
					%	%	%	%	%	%	%	%	%	%		%				
clearing & compaction earthwork	6 39	m ² m ³	15,000 15,000	90,000 585,000	24,300 157,950	27 27	65,700 427,050	73 73	13,140 85,410	20 20	36,135 234,878	55 55	16,425 106,763	25 25	27,459 178,484	113 113	27,459 178,484	2,529 16,441	5 5	1,215 7,898
sub base course 30cm	244	m ³	2,700	658,800	177,876	27	480,924	73	96,185	20	264,508	55	120,231	25	201,000	113	201,000	18,516	5	8,894
agg. base course 15cm	287	m ³	1,350	387,450	104,612	27	282,839	73	56,568	20	155,551	55	70,710	25	118,211	113	118,211	10,889	5	5,231
prime coat	13.5	m ²	9,000	121,500	32,805	27	88,695	73	17,739	20	48,782	55	22,174	25	37,070	113	37,070	3,415	5	1,640
base course 15cm	1,185	m ³	1,350	1,599,750	431,933	27	1,167,818	73	233,564	20	642,300	55	291,954	25	488,084	113	488,084	44,961	5	21,597
wearing course 5cm	1,427	m ³	450	642,150	173,381	27	468,770	73	93,754	20	257,823	55	117,192	25	196,920	113	196,920	18,048	5	8,669
pedestrians					0,000		0,000		0,000		0,000		0,000		0,000		0,000	0,000		0,000
sub base course 10cm	244	m ³	600	146,400	39,528	27	106,872	73	21,374	20	58,718	55	26,718	25	44,667	113	44,667	4,115	5	1,976
base course 10cm	287	m ³	600	172,200	46,494	27	125,706	73	25,141	20	69,138	55	31,427	25	52,538	113	52,538	4,840	5	2,325
surfacing 5cm	71	m ²	6,000	426,000	115,020	27	310,980	73	62,196	20	171,039	55	77,745	25	129,973	113	129,973	11,973	5	5,751
structures	200,000	each	3	600,000	162,000	27	438,000	73	87,600	20	240,900	55	109,500	25	183,060	113	183,060	16,863	5	8,100
drainage	1,500,000	km	1	1,500,000	405,000	27	1,095,000	73	219,000	20	602,250	55	273,750	25	457,650	113	457,650	42,158	5	20,250
miscellaneous					0,000		0,000		0,000		0,000		0,000		0,000		0,000	0,000		0,000
lightings	580,000	km	1	580,000	156,600	27	423,400	73	84,600	20	232,870	55	105,850	25	176,958	113	176,958	16,301	5	7,830
signals	300,000	each	3	900,000	243,000	27	657,000	73	131,400	20	361,350	55	164,250	25	274,590	113	274,590	25,295	5	12,150
signs & markings	170,000	km	1	170,000	45,900	27	124,100	73	24,820	20	68,255	55	31,025	25	51,867	113	51,867	4,778	5	2,295
pedestrian Xings	297,000	each	1	297,000	80,190	27	216,810	73	43,362	20	119,246	55	54,203	25	90,615	113	90,615	8,347	5	4,010
util. relocation	600,000	km	1	600,000	162,000	27	438,000	73	87,600	20	240,900	55	109,500	25	183,060	113	183,060	16,863	5	8,100
total facilities & systems				9,476,250	2,558,588		6,917,663		1,383,533		3,804,714		1,723,416		2,891,204		2,891,204	266,330		127,929
land	800	m ²	15,000	12,000,000	0,000	100	12,000,000	100	0,000	0	0,000	0	0,000	0	12,000,000	0	12,000,000	0,000	0	0,000
engineering project admin.	10 5	% %	9,476 9,476	947,625 473,813	0,000 0,000	0	947,625 473,813	100 100	379,050 379,050	40 80	189,525 94,763	20 20	379,050 0,000	40 0	0,000 0,000	0	0,000 0,000	13,267 6,633	0	0,000
subtotal				22,897,688	2,558,588		20,339,100		2,141,633		4,089,002		2,108,466		2,891,204		2,891,204	266,230		127,929
contingencies	5	%		1,144,884	127,929		1,016,955		107,082		204,450		105,423		144,560		144,560	14,312		6,396
TOTAL				24,042,572	2,686,517		21,356,055		2,248,714		4,293,452		2,213,889		3,035,764		3,035,764	300,542		134,325

CONSTRUCTION COST
(ROAD - 1)

unit : thousand Rs.

item	without taxes & duties	with taxes & duties
[local cost]		
labor	2,350.753	
material	4,488.274	
other	2,314.348	
land	15,750.000	
subtotal	24,903.375	24,903.375
import taxes & duties		3,173.517
taxes on local materials		314.179
total local costs		28,391.071
[foreign cost]		
foreign cost	2,808.422	
freight on import	140.421	
total foreign costs	2,948.843	2,948.843
TOTAL	27,852.218	31,339.914
total length in km	1.000	1.000
cost per km	27,852.218	31,339.914

COST TABULATION (ROAD -1) 2 lane ~ 4 lane

item	unit cost Rs	unit	quantity	costs without taxes & duties		foreign costs		local costs		labor		material		other		land		import taxes & duties		taxes on incl mtl		freight on import	
				Rs	%	Rs	%	Rs	%	Rs	%	Rs	%	Rs	%	Rs	%	Rs	%	Rs	%	Rs	%
demolition	100	m ²	15,000	1,500,000	27	405,000	27	1,095,000	73	219,000	20	602,250	25	273,750	25	113	457,650	56	42,158	56	20,250	5	
earthwork	39	m ³	15,000	585,000	27	157,950	27	427,050	73	85,410	20	234,878	25	106,763	25	113	178,484	56	16,441	56	7,898	5	
sub base course 30cm	244	m ³	2,700	658,800	27	171,876	27	480,924	73	96,185	20	254,508	25	120,231	25	113	201,000	56	18,516	56	8,894	5	
agg. base course 15cm	287	m ³	1,350	387,450	27	104,612	27	282,839	73	56,568	20	155,561	25	70,710	25	113	118,211	56	10,889	56	5,231	5	
prime coat	13.5	m ²	9,000	121,500	27	32,805	27	88,695	73	17,739	20	48,782	25	22,174	25	113	37,070	56	3,415	56	1,640	5	
base course 15cm	1,185	m ²	1,350	1,599,750	27	431,933	27	1,167,818	73	233,564	20	642,300	25	291,954	25	113	488,084	56	44,961	56	21,597	5	
wearing course 5cm	1,427	m ²	450	642,150	27	173,381	27	468,770	73	93,754	20	257,823	25	117,192	25	113	195,920	56	18,048	56	8,669	5	
pedestrians						0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000							0.000	0.000	
sub base course 10cm	244	m ³	600	146,400	27	39,528	27	106,872	73	21,374	20	58,780	25	26,718	25	113	44,667	56	4,115	56	1,976	5	
base course 10cm	287	m ³	600	172,200	27	46,494	27	125,706	73	25,141	20	69,138	25	31,427	25	113	52,538	56	4,840	56	2,325	5	
surfacing 5cm	71	m ²	6,000	426,000	27	115,020	27	310,980	73	62,196	20	171,039	25	77,745	25	113	129,973	56	11,973	56	5,751	5	
structures	200,000	each	3	600,000	27	162,000	27	438,000	73	87,600	20	240,900	25	109,500	25	113	183,060	56	16,863	56	8,100	5	
drainage	1,500,000	km	1	1,500,000	27	405,000	27	1,095,000	73	219,000	20	602,250	25	273,750	25	113	457,650	56	42,158	56	20,250	5	
miscellaneous						0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000							0.000	0.000	
restoration-lightings	200,000	km	1	200,000	27	54,000	27	146,000	73	29,200	20	80,300	25	36,500	25	113	61,020	56	5,621	56	2,700	5	
restoration-signals	100,000	each	3	300,000	27	81,000	27	219,000	73	43,800	20	120,450	25	54,750	25	113	91,530	56	8,432	56	4,050	5	
signs & markings	170,000	km	1	170,000	27	45,900	27	124,100	73	24,820	20	68,255	25	31,025	25	113	51,867	56	4,778	56	2,295	5	
pedestrian Xings	297,000	each	1	297,000	27	80,190	27	216,810	73	43,362	20	119,246	25	54,203	25	113	90,615	56	8,347	56	4,010	5	
util. relocation	600,000	km	1	600,000	27	162,000	27	438,000	73	87,600	20	240,900	25	109,500	25	113	183,060	56	16,863	56	8,100	5	
total facilities & systems				9,906,250		2,674,688		7,231,563		1,446,313		3,977,359		1,807,891			3,022,397		278,415		133,734		
land	1,000	m ²	15,000	15,000,000	0	0.000	0.000	15,000,000	100	0.000	0	0.000	0	0.000	0		15,000,000	0	0.000	0	0.000	0	
engineering project admin.	10	%	9,906	990,625	0	0.000	0.000	990,625	100	396,250	40	198,125	40	396,250	0		0	0	0.000	0	13,869	0	
	5	%	9,906	495,313	0	0.000	0.000	495,313	100	396,250	80	99,063	0	0.000	0		0	0	0.000	0	6,934	0	
subtotal				26,392,188		2,674,688		23,717,500		2,238,813		4,274,547		2,204,141			3,022,397		299,218		133,734		
contingencies	5	%		1,319,609		133,734		1,185,875		111,941		213,727		110,207			151,120		14,961		6,687		
TOTAL				27,711,797		2,808,422		24,903,375		2,350,753		4,488,274		2,314,348			3,173,517		314,179		140,421		

CONSTRUCTION COST
(ROAD - 2)

unit : thousand Rs.

item	without taxes & duties	with taxes & duties
[local cost]		
labor	3,330.007	
material	6,357.956	
other	3,278.436	
land	10,500.000	
subtotal	23,466.400	23,466.400
import taxes & duties		4,495.510
taxes on local materials		445.057
total local costs		28,406.966
[foreign cost]		
foreign cost	3,978.327	
freight on import	198.916	
total foreign costs	4,177.244	4,177.244
TOTAL	27,643.643	32,584.210
total length in km	1.000	1.000
cost per km	27,643.643	32,584.210

COST TABULATION (ROAD -2) 2 lane ~ 6 lane

item	unit cost Rs	unit	quantity	costs without taxes & duties	foreign costs		local costs		labor Rs	material Rs		other Rs	land Rs	import taxes & duties		taxes 12.5% on lcl mtl		freight on import		
					%	Rs	%	Rs		%	Rs			%	Rs	%	Rs	%	Rs	%
demolition	100	m2	25,000	2,500,000	27	675,000	73	1,825,000	20	365,000	55	1,003,750	25	456,250	113	762,750	56	70,263	5	33,750
earthwork	39	m3	25,000	975,000	27	263,250	73	711,750	20	142,350	55	391,463	25	177,938	113	237,473	56	27,402	5	13,163
sub base course 30cm	244	m3	4,800	1,171,200	27	316,224	73	854,976	20	170,995	55	470,237	25	213,744	113	357,333	56	32,917	5	15,811
arg. base course 30cm	287	m3	4,800	1,377,600	27	371,952	73	1,005,648	20	201,130	55	553,106	25	251,412	113	420,306	56	38,717	5	18,598
prime coat	13.5	m2	16,000	216,000	27	58,320	73	157,680	20	31,536	55	86,724	25	39,420	113	65,902	56	6,071	5	2,916
base course 10cm	1.185	m3	1,600	1,896,000	27	511,920	73	1,384,080	20	276,816	55	761,244	25	346,020	113	578,470	56	53,287	5	25,596
wearing course 5cm	1.427	m3	800	1,141,600	27	308,232	73	833,368	20	166,674	55	458,352	25	208,342	113	348,302	56	32,085	5	15,412
pedestrians						0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
sub base course 10cm	244	m3	500	122,000	27	32,940	73	89,060	20	17,812	55	48,983	25	22,285	113	37,222	56	3,429	5	1,647
base course 10cm	287	m3	500	143,500	27	38,745	73	104,755	20	20,951	55	57,615	25	26,189	113	43,782	56	4,033	5	1,937
surfacing 5cm	71	m2	5,000	355,000	27	95,850	73	259,150	20	51,830	55	142,533	25	64,783	113	108,311	56	9,977	5	4,793
structures	400,000	each	3	1,200,000	27	324,000	73	876,000	20	175,200	55	481,800	25	219,000	113	366,120	56	33,726	5	16,200
drainage	1,500,000	km	1	1,500,000	27	405,000	73	1,095,000	20	219,000	55	602,250	25	273,750	113	457,650	56	42,158	5	20,250
miscellaneous						0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
restoration-lightings	200,000	km	1	200,000	27	54,000	73	146,000	20	29,200	55	80,300	25	36,500	113	61,020	56	5,621	5	2,700
restoration-signals	100,000	each	3	300,000	27	81,000	73	219,000	20	43,800	55	120,450	25	54,750	113	91,530	56	8,432	5	4,650
signs & markings	340,000	km	1	340,000	27	91,800	73	248,200	20	49,640	55	136,510	25	62,050	113	103,734	56	9,556	5	4,590
pedestrian Xings	495,000	each	1	495,000	27	133,650	73	361,350	20	72,270	55	198,743	25	90,338	113	151,025	56	13,912	5	6,633
util. relocation	100,000	km	1	100,000	27	27,000	73	73,000	20	14,600	55	40,150	25	18,250	113	30,510	56	2,811	5	1,350
total facilities & systems				14,032,900		3,788,883		10,244,017		2,048,803		5,634,209		2,561,004		4,281,438		394,395		189,444
land	400	m2	25,000	10,000,000	0	0.000	100	10,000,000	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
engineering project admin.	10	%	14,033	1,403,290	0	0.000	100	1,403,290	40	561,316	20	280,658	40	561,316	0	0.000	56	19,646	0	0.000
	5	%	14,033	701,645	0	0.000	100	701,645	30	561,316	20	140,329	0	0.000	0	0.000	56	9,823	0	0.000
subtotal				26,137,835		3,788,883		22,348,952		3,171,435		6,055,196		3,122,320		4,281,438		423,864		189,444
contingencies	5	%		1,306,892		189,444		1,117,448		158,572		302,760		156,116		214,972		21,193		9,472
TOTAL				27,444,727		3,978,327		23,466,400		3,330,007		6,357,956		3,278,436		4,495,510		445,057		198,916

CONSTRUCTION COST
(H R T S Y S T E M)

unit : million Rs.

item	without taxes & duties	with taxes & duties
[local cost]		
labor	6.664	
material	12.554	
other	6.089	
land	1.188	
subtotal	26.495	26.495
import taxes & duties		16.733
taxes on local materials		0.879
total local costs		44.107
[foreign cost]		
foreign cost	20.220	
freight on import	0.901	
total foreign costs	21.121	21.121
TOTAL	47.617	65.228
total length in km	1.000	1.000
cost per km	47.617	65.228

COST TABULATION (HRT S SYSTEM)

item	unit cost Rs	unit quantity	costs without taxes & duties	foreign costs		local costs		labor Rs %	material Rs %	other Rs %	land Rs	import taxes & duties %	taxes 12.5% on incl mtl %	freight on import %						
				%	Rs	%	Rs													
trackwork at Jia Bagea	615,000	km	0.308	27	0.083	73	0.224	20	0.045	55	0.123	25	0.056	113	0.094	56	0.009	5	0.004	
yards and shops	125,000	veh	6.000	27	1.620	73	4.380	20	0.876	55	2.409	25	1.095	113	1.831	56	0.169	5	0.081	
yard & shop equipment	35,500	veh	1.704	27	0.460	73	1.244	20	0.249	55	0.684	25	0.311	113	0.520	56	0.048	5	0.023	
substation facil.	345,000	each	0.345	27	0.093	73	0.252	20	0.050	55	0.139	25	0.063	113	0.105	56	0.010	5	0.005	
power distribution	10,000	each	0.010	27	0.003	73	0.007	20	0.001	55	0.004	25	0.002	113	0.003	56	0.000	5	0.000	
rolling stocks	13,248,000	each	21.197	61	12.930	39	8.267	20	1.653	55	4.547	25	2.067	70	9.951	56	0.318	5	0.647	
total facilities & systems			29.563		15.189		14.374		2.875		7.906		3.594		11.604		0.553		0.759	
land	400	m2	1.030	0	0.000	100	1.030	0	0.000	0	0.000	0	0.000	0	0.000	56	0.000	0	0.000	
training & startup	5	%	1.478	27	0.399	73	1.079	80	0.853	20	0.216	0	0.000	113	0.451	56	0.015	0	0.000	
spare parts	15	%	4.434	27	1.197	73	3.237	5	0.162	75	2.428	20	0.647	113	1.353	56	0.170	5	0.060	
engineering	15	%	4.434	27	1.197	73	3.237	40	1.295	20	0.647	40	1.295	113	1.353	56	0.045	0	0.000	
project admin.	5	%	1.478	27	0.399	73	1.079	80	0.853	20	0.216	0	0.000	113	0.451	56	0.015	0	0.000	
subtotal			42.469		18.382		24.087		6.058		11.413		5.536		15.212		0.799		0.819	
contingencies	10	%	4.247		1.838		2.409		0.606		1.141		0.554		1.521		0.030		0.032	
TOTAL			46.715		20.220		26.495		6.664		12.554		6.089		16.733		0.879		0.901	

CONSTRUCTION COST
(L R T S Y S T E M)

unit : million Rs.

item	without taxes & duties	with taxes & duties
[local cost]		
labor	49.814	
material	98.453	
other	47.309	
land	1.188	
subtotal	196.765	196.765
import taxes & duties		93.295
taxes on local materials		6.892
total local costs		296.951
[foreign cost]		
foreign cost	108.403	
freight on import	4.687	
total foreign costs	113.090	113.090
TOTAL	309.855	410.042
total length in km	1.000	1.000
cost per km	309.855	410.042

CONSTRUCTION COST
(B U S W A Y 1)

unit : million Rs.

item	without taxes & duties	with taxes & duties
[local cost]		
labor	6.700	
material	14.826	
other	7.175	
land	0.220	
subtotal	28.922	28.922
import taxes & duties		14.502
taxes on local materials		1.038
total local costs		44.461
[foreign cost]		
foreign cost	12.402	
freight on import	0.534	
total foreign costs	12.936	12.936
TOTAL	41.858	57.397
total length in km	1.000	1.000
cost per km	41.858	57.397

COST TABULATION (BUSWAY SYSTEM 1) AT GRADE

item	unit cost Rs	unit	quantity	costs without taxes & duties	foreign costs		local costs		labor Rs	material Rs		other Rs	land Rs	import taxes & duties %	taxes 12.5% on [c] mtl %	freight on import %
					%	%	%	%		%	%					
station at grade at grade busway at grade taper surfacing	4,000,000	each	1	4,000	1,080	2,920	73	0.584	1,606	25	0.730	113	1,220	0.112	5	0.054
	5,900	m	900	5,310	1,434	3,876	73	0.775	2,132	25	0.969	113	1,620	0.149	5	0.072
	92,300	each	3	0,277	0,075	0,202	73	0,040	0,111	25	0,051	113	0,084	0,008	5	0,004
	71	m ²	9,000	0,639	0,173	0,466	73	0,093	0,257	25	0,117	113	0,195	0,018	5	0,009
miscellaneous lightings signals signs & markings pedestrian Xings util. relocation	3,144,000	km	1	3,144	0,849	2,295	73	0,459	1,262	25	0,574	113	0,959	0,088	5	0,042
	810,000	each	3	2,430	0,656	1,774	73	0,355	0,976	25	0,443	113	0,741	0,068	5	0,033
	240,000	km	1	0,240	0,065	0,175	73	0,035	0,096	25	0,044	113	0,073	0,007	5	0,003
	1,584,000	each	3	4,752	1,283	3,469	73	0,694	1,908	25	0,867	113	1,450	0,134	5	0,064
	2,860,000	km	1	2,860	0,772	2,088	73	0,418	1,148	25	0,522	113	0,873	0,080	5	0,039
	316,000	each	12.1	3,824	2,218	1,606	42	0,321	0,883	25	0,401	133	2,950	0,062	5	0,111
total facilities & systems				27,476	8,604	18,872		3,774	10,379		4,718		10,166	0,727		0,430
	400	m ²	500	0,200	0,000	0,200	100	0,000	0,000	0	0,000	0	0,200	0,000	56	0,000
traffic maintenance spare parts	1	%	27,476	0,275	0,074	0,201	73	0,160	0,040	0	0,000	113	0,084	0,000	56	0,000
	15	%	27,476	4,121	1,113	3,009	73	0,150	2,266	20	0,602	113	1,257	0,158	56	0,056
engineering project admin.	15	%	27,476	4,121	1,113	3,009	73	1,203	0,602	40	1,203	113	1,257	0,000	56	0,000
	5	%	27,476	1,374	0,371	1,003	73	0,802	0,201	0	0,000	113	0,419	0,014	56	0,000
subtotal				37,567	11,274	26,292		6,091	13,478		6,523		13,184	0,943		0,486
contingencies	10	%		3,757	1,127	2,629		0,609	1,348		0,652		0,020	0,094		0,049
TOTAL				41,323	12,402	28,922		6,700	14,826		7,175		0,220	1,038		0,534

CONSTRUCTION COST
(B U S W A Y 2)

unit : million Rs.

item	without taxes & duties	with taxes & duties
[local cost]		
labor	22.085	
material	49.181	
other	23.755	
land	0.880	
subtotal	95.901	95.901
import taxes & duties		42.220
taxes on local materials		3.443
total local costs		141.563
[foreign cost]		
foreign cost	36.931	
freight on import	1.571	
total foreign costs	38.502	38.502
T O T A L	134.403	180.066
total length in km	1.000	1.000
cost per km	134.403	180.066

COST TABULATION (BUSWAY SYSTEM 2) ON ELEVATED STRUCTURE

item	unit cost Rs	unit	quantity	costs without taxes & duties	foreign costs		local costs		labor		material		other		land Rs	import taxes & duties		taxes 12.5% on incl mtl		freight on import	
					%	%	%	%	%	%	%	%	%	%		%	%	%	%	%	%
elevated station	14,170,000	each	1	14,170	3,825	73	10,344	2,069	55	5,689	25	2,586	113	4,323	0.398	5	0.191				
elevated busway	55,000	m	900	49,500	13,365	73	36,135	7,227	55	19,874	25	9,034	113	15,102	1.391	5	0.668				
elevated taper	115,200	each	2	0.230	0.082	73	0.168	0.034	55	0.093	25	0.042	113	0.070	0.005	5	0.003				
ramp	6,414,000	each	1	6,414	1,732	73	4,682	0.936	55	2,575	25	1,171	113	1,957	0.180	5	0.087				
surfacing	71	m2	9,000	0.639	0.173	73	0.466	0.093	55	0.257	25	0.117	113	0.195	0.018	5	0.009				
miscellaneous																					
lightings	3,144,000	km	1	3,144	0.849	73	2,295	0.459	20	1,282	25	0.574	113	0.959	0.088	5	0.042				
signals	810,000	each	3	2,430	0.656	73	1,774	0.355	55	0.976	25	0.443	113	0.741	0.658	5	0.033				
signs & markings	240,000	km	1	0.240	0.065	73	0.175	0.035	55	0.096	25	0.044	113	0.073	0.007	5	0.003				
pedestrian Xings	1,584,000	each	3	4,752	1,283	73	3,469	0.694	20	1,908	25	0.867	113	1,450	0.134	5	0.064				
util. relocation	2,860,000	km	1	2,860	0.772	73	2,088	0.418	20	1,148	25	0.522	113	0.873	0.080	5	0.039				
vehicles	316,000	each	12.1	3,824	2,218	58	1,606	0.321	20	0.883	25	0.401	133	2,950	0.062	5	0.111				
total facilities & systems				88,203	25,000		63,203	12,641		34,762		15,801		28,694	2,433		1,250				
land	400	m2	2,000	0.800	0.000	100	0.800	0.000	0	0.000	0	0.000	0	0.000	0.800	0	0.000				
traffic maintenance	1	%	88,203	0.882	0.238	73	0.644	0.515	80	0.129	0	0.000	113	0.259	0.000	0	0.000				
spare parts	15	%	88,203	13,230	3,572	73	9,658	0.483	5	7,244	20	1,932	113	4,037	0.507	5	0.179				
engineering	15	%	88,203	13,230	3,572	73	9,658	0.000	40	0.000	40	3,863	113	4,037	0.000	0	0.000				
project admin.	5	%	88,203	4,410	1,191	73	3,219	2,576	80	0.644	0	0.000	113	1,346	0.045	0	0.000				
subtotal				120,756	33,573		87,183	20,077		44,710		21,596		38,382	3,130		1,429				
contingencies	10	%		12,076	3,357		8,718	2,008		4,471		2,160		3,838	0.313		0.143				
TOTAL				132,832	36,931		95,901	22,085		49,181		23,755		42,220	3,443		1,571				

OPERATION AND MAINTENANCE COSTS

(1) Road

Operation and maintenance costs include operation, maintenance, repairs and recurring indirect costs like salaries of staff, etc. O and M costs of open road referred to in NTRC report and adopted as 25,000 Rs. / km / annum and 35,000 Rs. / km / annum for economic and financial price respectively.

unit : thousand Rs.

Description	Unit Cost		Unit	Quantity	O and M costs	
	Economic	Financial			Economic costs	Financial costs
Road 6-lanes	75.0	105.0	km	9.20	690	966
Road 4-lanes (Urban)	50.0	70.0	km	99.15	4,958	6,941
Road 4-lanes (Suburban)	50.0	70.0	km	80.30	4,015	5,621
Road 2-lanes	25.0	35.0	km	18.25	456	639
Road improvement 2 into 4 lanes	50.0	70.0	km	62.75	3,138	4,393
Road improvement 2 into 6 lanes	75.0	105.0	km	6.45	484	677
Interchange	50.0	70.0	each	1	50	70
Flyover (above road)	15.0	21.0	each	7	105	147
Flyover (above railway)	19.0	26.6	each	6	114	160
Ravi Bridge	50.0	70.0	each	3	150	210

(2) Heavy Rail Transit (HRT)

Operation and maintenance costs of HRT consist of staffing needs, physical facility electrical energy usage, rail vehicle component repair and replacement costs, and the fleet and service statistics resulting from rail passenger service. HRT annual O and M costs were estimated to be given in Karachi Mass Transit Study (1987 prices) as follows :

	HRT (Rs)	HRT %
energy	396,254,639	41.92 %
demand	124,835,751	13.21 %
veh. mtc. svcs & matl.	186,327,504	19.71 %
way & struc svcs & matl.	47,443,968	5.02 %
sta & bldg svcs & matl.	9,460,000	1.00 %
electr. svcs & matl.	86,261,760	9.13 %
sgnl / cmmnca svcs & matl.	28,753,920	3.04 %
motor pool mtc & fuel	1,851,994	0.20 %
claims & liabil	987,804	0.10 %
advertis / info	987,804	0.10 %
personnel & hous. allow.	45,626,400	4.83 %
personnel fringes	16,425,504	1.74 %
total O & M cost	945,217,047	100.00 %
cost per veh. km	19.296	

HRT vehicle operation will be calculated as follows :

Peak hour : 12 min. headway, 5 trains / hr × 5 hr = 25 trains / day
 Off Peak hour : 20 min. headway, 3 trains / hr × 12 hr = 36 trains / day
total 61 trains / day

Annual train km = 61 × 30 km × 365 days = 667,950
 Annual vehicle km = 667,950 × 6 cars = 4,000,000

End of 1990 price equivalence = $\frac{\$ 21.70 \text{ (1990 price)}}{\$ 18.00 \text{ (1987 price)}} = 1.20$

Annual O and M costs for economic price will be
 $4,000,000 \times 19.296 \times 1.20 = \underline{92.62 \text{ mil. Rs.}}$

Annual O and M costs for financial price will be estimated on the basis of the ratio of economic and financial construction costs in the followings :

$92.62 \times \frac{65.2 \text{ (financial)}}{47.6 \text{ (economic)}} = \underline{126.87 \text{ mil. Rs.}}$

(3) Light Rail Transit (LRT)

LRT annual Operation and Maintenance costs consist of the same items as HRT as described above. They were estimated to be given in Karachi Mass Transit Study (1987 prices) as follows :

	LRT (Rs)	LRT %
energy	144,344,218	31.63 %
demand	36,974,514	8.10 %
veh. mtc. svcs & matl.	116,880,991	25.61 %
way & struc svcs & matl.	30,780,000	6.74 %
sta & bldg svcs & matl.	6,400,000	1.40 %
electr. svcs & matl.	61,560,000	13.49 %
sgnl / cmmnca svcs & matl.	6,156,000	1.35 %
motor pool mtc & fuel	1,392,257	0.31 %
claims & liabil	610,222	0.13 %
advertis / info	610,222	0.13 %
personnel & hous. allow.	37,281,600	8.17 %
personnel fringes	13,421,376	2.94 %
total O & M cost	456,411,400	100.00 %
cost per veh. km	16.596	

LRT vehicle operation will be calculated as follows :

Peak hour	: 2 min. headway, 30 trains / hr × 5 hr = 150 trains / day
Off Peak hour	: 5 min. headway, 12 trains / hr × 8 hr = 96 trains / day
Off Peak hour	: 10 min. headway, 6 trains / hr × 8 hr = 48 trains / day
	<u>total 294 trains / day</u>

$$\begin{aligned} \text{Annual train km} &= 294 \times 15 \text{ km} \times 365 \text{ days} = 1,610,000 \\ \text{Annual vehicle km} &= 1,610,000 \times 2 \text{ units} = 3,220,000 \end{aligned}$$

$$\text{End of 1990 price equivalence} = \frac{\$ 21.70 \text{ (1990 price)}}{\$ 18.00 \text{ (1987 price)}} = 1.20$$

$$\begin{aligned} \text{Annual O and M costs for economic price will be} \\ 3,220,000 \times 16.596 \times 1.20 = \underline{64.13 \text{ mil. Rs.}} \end{aligned}$$

Annual O and M costs for financial price will be estimated on the basis of the ratio of economic and financial construction costs in the followings :

$$64.13 \times \frac{410.0 \text{ (financial)}}{309.9 \text{ (economic)}} = \underline{84.84 \text{ mil. Rs.}}$$

(4) Busway System

Operation and maintenance costs for bus are based on data describing Karachi Mass Transit Study in 1987. The data were applied to traffic congestion scenarios yielding a range of average traffic speeds. The fuel consumption results were used directly in the following model by relating fuel consumption to vehicle time as well as vehicle distance. The same results were used to infer cost effect on vehicle maintenance costs as well.

The O and M costs for a given operating situation is represented by the sum of (number of vehicles \times coefficient 1) plus (vehicle km \times coefficient 2) plus (vehicle hr \times coefficient 3).

$$\begin{aligned} \text{coefficient 1 : } 7,874 \times \frac{\$ 21.70}{\$ 18.00} &= 9,449 \cdot \text{veh.} \\ \text{coefficient 2 : } 1.025 \times \frac{\$ 21.70}{\$ 18.00} &= 1.230 \cdot \text{km} \\ \text{coefficient 3 : } 30.68 \times \frac{\$ 21.70}{\$ 18.00} &= 36.82 \cdot \text{hr} \end{aligned}$$

Study team estimated for bus operation planning as follows :

No. of busway = 520 buses
Annual bus \cdot km = 28.47 mil.km
Annual bus \cdot hr = 1.36 mil.hr

Annual O and M costs for bus vehicles are :

$$(9,449 \times 520) + (1.230 \times 28.47 \text{ mil.}) + (36.82 \times 1.36 \text{ mil.}) \\ = 90.00 \text{ mil. Rs. } \textcircled{1}$$

The O and M costs for busway facilities are estimated the same HRT and LRT as described above. They were estimated to be given in Karachi Transit Study (1987 prices) as follows :

	Busway Rs.
energy	17,098,449
demand	5,367,437
veh. mtc. svcs & matl.	0
way & struc svcs & matl.	29,611,008
sta & bldg svcs & matl.	5,760,000
electr. svcs & matl.	1,175,040
sgnl / cmmnca svcs & matl.	587,520
motor pool mtc & fuel	1,311,040
claims & liabil	1,062,061
advertis / info	531,030
personnel & hous. allow.	12,858,000
personnel fringes	4,628,880
total O & M cost	79,990,465
cost per veh. km	0.684

$$\text{End of 1990 price equivalence} = \frac{\$ 21.70 \text{ (1990 price)}}{\$ 18.00 \text{ (1987 price)}} = 1.20$$

Annual bus · km is 28.47 mil.km.

Annual O and M costs for busway facilities are :

$$0.684 \times 1.20 \times 28.47 \text{ mil.} = 23.37 \text{ mil. Rs.} \dots\dots\dots \textcircled{2}$$

Therefore, total annual O and M costs for economic price will be

$$\textcircled{1} + \textcircled{2} = 90.00 + 23.37 = \underline{113.4 \text{ mil. Rs.}}$$

Annual O and M costs for financial price will be estimated on the basis of the ratio of economic and financial construction costs in the followings :

$$113.4 \times \frac{180.1 \text{ (financial)}}{134.4 \text{ (economic)}} = \underline{152.0 \text{ mil. Rs.}}$$

APPENDICES FOR CHAPTER 9

Appendix Table 9.3.1 Characteristics of Representative Vehicles

Type of Vehicle	Motor Cycle Suzuki 100	Auto Rickshaw Vespa	Car Toyota 1300	Wagon Toyota Hi Ace	Medium Bus Isuzu MPR59LU	Heavy Bus Hino AK176KA	Truck Hino FF173	Truck Trailer Hino HE345F
Length (m)	1.915		4.185	4.725		11.105	7.650	12.610
Width (m)	0.735		1.635	1.690		2.490	2.385	2.490
Hight (m)	1.025		1.385	1.945		3.040	2.565	2.980
Number of Axles	2	2	2	2	2	2	2	2
Number of Wheels	2	3	4	4	6	6	6	14
Tyre Size	3.00	3.00	615-13-6Rp	650-14-8PR		900-200-14PR	1000-20-14PR	1100-20-14PR
Engine Capacity (cc)	98	98	1.295	2.446		6.443	6.443	13.267
Gross Horse Power	12	12	71	79		165	165	270
Loading Capacity	2	3	5	15	25-30	45-64	11	25
Type of Fuel	Petrol	Petrol	Petrol	Diesel	Diesel	Diesel	Diesel	Diesel
Service Life	12	12	10	10	11	11	12	12
Av. Year Round Speed (Km/hr)	40	40	50	45	45	50	40	40
Annual Utilization (1,000km)	10	50	14	50	50	65	75	65

Source : NTRC (1980) and Consultants' hearings

Appendix Table 9.3.2 Price of Vehicle and Tyre, 1990

	Prices (1990)	Motor Cycle (SUZUKI)	Auto Rickshaw (VESPA)	Car (TOYOTA 1300)	Wagon (TOYOTA Hi-Ace)	Medium Bus (ISUZU MPR59LU)	Bus* (HINO AK176KA)	Truck (HINO FF173)	Truck* Trailer (HINO HE345F)
Vehicle	Market Price (Economic Price)	23,800	105,000	501,600	533,400	966,800	460,800	707,800	1,276,800
	Factor Cost (Economic Price)	10,280	45,360	177,060	143,480	243,930	339,150	520,940	939,720
Tyre	Market Price (Financial Price)	220	330	850	1,650	2,480	6,200	6,200	7,700
	Factor Cost (Economic Price)	100	140	370	710	1,070	2,680	2,680	3,330

Source : "1990 Review of Indus Highway Project" CPCL-EA-TC, 1990), and Consultants' Discussion with Vehicle Dealers/Agencies in Oct., 1990.

* Chassis imported and frames built locally.

Appendix Table 9.3.3 Fuel Prices and Tax Elements

	(Rs./liter)		
	HOBC	Gasoline	H.S.D.
Former Case A			
Ex-Refinery	3.39595	2.36337	1.67923
Duty	0.88	0.88	0.25
Dev't Surcharge	4.40	3.38	1.60
Transport Margin	0.41405	0.40663	0.58877
Sales Prices	8.58	6.95	3.85
(Economic Prices)	(3.81)	(2.77)	(2.00)
Former Case B			
Ex-Refinery	3.04595	2.35337	2.33923
Duty	0.88	0.88	0.25
Dev't Surcharge	4.19	3.51	0.89
Transport Margin	0.46405	0.40663	0.37077
Sales Prices	8.58	7.15	3.85
(Economic Prices)	(3.51)	(2.76)	(2.71)
Present Case			
Ex-Refinery	3.17375	2.72530	2.51543
Duty	0.88	0.88	0.25
Dev't Surcharge	4.40	4.20	0.98
Transport Margin	0.48625	0.47470	0.39457
Sales Prices	8.94	8.28	4.14
(Economic Prices)	(3.66)	(3.20)	(2.91)

Source : Former Case A : "Road User Charges in Pakistan (Draft Final Report)" (Jan., 1987 NTRC)
 Former Case B : "Realignment of National Highway (N-5) near Lahore" (Apr., 1990 NTRC)
 Present Case : Based on the Government's Announcement in May, 1990.

Appendix Table 9.3.4 Value of Vehicle Operating Cost Inputs

	Motor Cycle	Auto Rackshaw	Car	Wagon (Mini Bus)	Medium Bus	Heavy Bus	Truck	Truck Trailer
Financial Costs								
Vehicle (w/o tyres)	23,800	105,000	501,600	533,400	906,800	460,800	707,800	1,276,800
Tyres	220	330	850	1,650	2,480	6,200	6,200	7,700
Fuel (per litre)	8.94	8.94	8.94	4.14	4.14	4.14	4.14	4.14
Oil (per litre)	24.89	24.89	24.89	24.89	24.89	24.89	24.89	24.89
Maintenance Labour (per hour)	15	15	15	15	15	15	15	15
Crew (per hour)	—	—	—	30	30	30	30	30
Interest (% per annum)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Passenger Time (Rs/hour per Vehicle)	15	20	43	70	125	184	—	—
Economic Costs								
Vehicle (w/o tyres)	10,280	45,360	177,060	143,480	243,930	339,150	520,940	939,720
Tyres	100	140	370	710	1,070	2,680	2,680	3,330
Fuel (per litre)	3.66	3.66	3.66	2.91	2.91	2.91	2.91	2.91
Oil (per litre)	—	—	—	—	—	—	—	—
Maintenance Labour (per hour)	10	10	10	10	10	10	10	10
Crew (per hour)	—	—	—	20	20	20	20	20
Interest (% per annum)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Passenger Time (Rs/hour per Vehicle)	15	20	43	70	125	184	—	—

Appendix Table 9.3.5 Duty and Tax Composition of Vehicles and Tyre

	Motor Cycle	Auto Rockshaw	Car	Wagon (Mini-Bus)	Medium Bus	Bus	Truck	Trailer	Tyres (All types)
1 CIF = 1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2 General Surcharge (10%)	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
3 Igra Surcharge (5%)	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050
4 Income Advance Tax(2%)	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020
5 Customs Duty (1+4)x5=(5)	1.000 (1.020)	1.000 (1.020)	1.500 (1.530)	2.350 (2.397)	2.350 (2.397)	0.200 (0.204)	0.200 (0.204)	0.200 (0.204)	1.000 (1.020)
6 Sales Tax (1+4)x6=(6)	0.125 (0.128)	0.125 (0.128)	0.125 (0.128)	0.125 (0.128)	0.125 (0.128)	—	—	—	0.125 (0.128)
7 Octroi (1.5%) (2+3+(5)+(6))x7=(7)	0.015 (0.019)	0.015 (0.019)	0.015 (0.027)	0.015 (0.040)	0.015 (0.040)	0.015 (0.005)	0.015 (0.005)	0.015 (0.005)	0.015 (0.019)
Total [2+3+(5)+(6)+(7)]	1.317	1.317	1.835	2.715	2.715	0.359	0.359	0.359	1.317
Total Tax Portion in percent of Market Price	56.8	56.8	64.7	73.1	73.1	26.4	26.4	26.4	56.8

Appendix Table 9.3.6 Summary of Time Value

Re-Alignment of National Highway (N-5) near Lahore : Draft Final Report, NRTC, 1990	Present Case
1) Per Capita GDP in 1988 was Rs.6038	1) Per Capita GNP in 1990 estimated Rs.8977
2) Working hours 8 hrs x 300 days = 2,400 hours per annum.	2) Working hours 7 hrs x 365 days = 2,555 hours per annum.
3) GDP per Labour Force per hour in 1988 = 10.75 (Rs.)	3) GNP per Labour Force per hour in 1990 = 12.27 (Rs.)
4) Different income levels were assumed for vehicle types.	4) Different income levels were assumed for vehicle types.
(1) M/C An average income of Rs.2000/m. and Rs.10/hr. Occupants 1.5 persons (average) Thus Rs.15 per M/C per hour.	(1) M/C Same as the former case Rs.15/hr. per M/C
(2) -	(2) Auto Rickshaw Same as above Occupants 2.0 persons Thus Rs.20/hr. per A/R
(3) Car Average income of Rs.4000/m. and Rs.20/hr, Occupants 2.6 persons in which others are with a value of Rs.5/hour. Rs.33/hour per car.	(3) Car An average income of Rs.6000/m and Rs.30/hr. Occupants 2.6 persons in which others are with a value of Rs.51
(4) Wagon (Mini-Bus) A higher earnings than bus passengers is assumed. Rs.5/hour per occupant and average 14 passengers. Rs.70/hr. per Wagon.	(4) Wagon Same as the left. Rs.70/hr. per wagon.
(5) -	(5) Medium Bus Same as above, but average 25 pass. Rs. 125/hr. per Medium Bus.
(6) Bus Assuming 75% of passengers related to work, and those work related persons have a half value of GDP per labour force per hour, the value of Rs.4/hr. per person was shown. Occupants of 42 persons result in Rs.168/hr. per bus.	(6) Bus On the same assumption as the left, value of 4.60Rs./hr. per person was shown. Occupants of 40 persons result in Rs.184/hr. per bus.
5) At 60 KPH the followings are calculated for the distance of a 100 km travel :	5) At 30 KPH, the followings are calculated for the distance of 5.7 km (average Trip-Distance) travel :
M/C : Rs.25.00	M/C : Rs.2.85
Car : Rs.55.00	A/R : Rs.3.80
Wagon : Rs.116.70	Car : Rs.8.17
	Wagon : Rs.13.30
	Medium Bus : Rs.23.75
Bus : Rs.280.00	Bus : Rs.34.96

Appendix Table 9.3.7 Equations of Vehicle Operating Cost Components

A. Fuel Consumption

Motor Cycle	$Y_a = 0.0077381S^2 - 0.582143S + 29.4048$
Auto Rickshaw	$Y_a = (0.0077381S^2 - 0.582143S + 29.4048) \times 1.5$
Car	$Y_a = 0.0280952S^2 - 2.18571S + 107.333$
Wagon	$Y_a = 0.024523S^2 - 2.50714S + 137.1904$
Medium Bus	$Y_a = (0.024523S^2 - 2.50714S + 137.1904) \times 1.2$
Heavy Bus	$Y_a = 0.0785714S^2 - 6.94286S + 353.286$
Truck (2 Axle)	$Y_a = 0.22643S^2 - 26.6673S + 980.375$
Truck Trailer	$Y_a = (0.22643S^2 - 26.6673S + 980.375) \times 1.5$

Where, Y_a = Fuel Consumption (litter/1,000km)
 S = Operating Speed (km/hr)

Variation for "un-improved road" = 1.1

(Source : NTRC-54 Fuel Consumption Study)

B. Engine Oil Consumption

Motor Cycle	$Y_b = 0.00008S^2 - 0.01312S + 1.47393$
Auto Rickshaw	$Y_b = (0.00008S^2 - 0.01312S + 1.47393) \times 1.25$
Car	$Y_b = 0.00036S^2 - 0.03897S + 2.14048$
Wagon	$Y_b = (0.00036S^2 - 0.03897S + 2.14048) \times 1.25$
Medium Bus	$Y_b = (0.00036S^2 - 0.03897S + 2.14048) \times 1.5$
Heavy Bus	$Y_b = 0.00118S^2 - 0.1377S + 7.54073$
Truck (2 Axle)	$Y_b = 0.00131S^2 - 0.15257S + 8.30869$
Truck Trailer	$Y_b = (0.00131S^2 - 0.15257S + 8.30869) \times 1.5$

Where, Y_b = Fuel Consumption (litter/1,000km)
 S = Operating Speed (km/hr)

(Source : "Quantification of Road User Savings", (Jan de Weille))

C. Tyre Wear

(1) Motor Cycle	$Y_c = (0.000464308S^2 - 0.0410687S + 0.250076) \times 0.25$
Auto Rickshaw	$Y_c = (0.000464308S^2 - 0.0410687S + 0.250076) \times 0.375$
Car	$Y_c = 0.000464308S^2 - 0.0410687S + 0.250076$
Wagon	$Y_c = (0.000892857S^2 - 0.0074999S + 1.22143)$
Medium Bus	$Y_c = 0.000892857S^2 - 0.0074999S + 1.22143$
Heavy Bus	$Y_c = 0.00254759S^2 - 0.0728531S + 3.65227$
Truck (2 Axle)	$Y_c = 0.00254759S^2 - 0.0728531S + 3.65227$
Truck Trailer	$Y_c = (0.00254759S^2 - 0.0728531S + 3.65227) \times 2.3$

Where, Y_c = Total per cent of Tyre Wear of Vehicle.
 Equated as wear of one tyre, per 1,000km.

S = Operating Speed (km/hr)

(Source : "NTRC-79 Vehicle Operating Cost., Jan. 1985" (NTRC 1988))

(2) Variation for Roughness

	Good	Fairly Good	Fair	Poor*	Very Poor**
R =	250	3000	3500	5000	7000
Motor Cycle Auto Rickshaw	1.00	1.46	1.95	3.34	5.21
Car, Wagon, Medium Bus, Heavy Bus, Truck, Truck Trailer	1.00	1.05	1.10	1.25	1.45

* Good Gravel
** Good Earth

(Source : TRRL 723 "Tables for Estimating Vehicle Operating Costs on Rural Roads in Developing Countries")

D. Maintenance Cost (Parts)

(1) Motor Cycle Auto Rickshaw	Yd = 0.05% / 1,000km
Car, Wagon, Medium Bus	Yd = 0.11% / 1,000km
Heavy Bus, Truck Truck Trailer	Yd = 0.18% / 1,000km

Where, Yd = Maintenance Parts, Equated as the per cent of Depreciable Value of the Vehicle per 1,000km

(Source : "NTRC-79 Vehicle Operating Cost")

(2) Variation for Roughness

	Good	Average	Poor
Motor Cycle Auto Rickshaw	1.0	1.36	1.72
Car, Wagon, Medium Bus	1.0	1.36	1.72
Heavy Bus, Truck Truck Trailer	1.0	1.13	1.26

E. Maintenance Labour

Motor Cycle Auto Rickshaw	2.0 hrs. 3.0 hrs.
Car Wagon, Medium Bus	3.8 hrs. 18.3 hrs.
Heavy Bus, Truck Truck Trailer	21.9 hrs.

F. Depreciation

Motor Cycle	Yf = 0.009872 - 0.00006484S
Auto Rickshaw	Yf = 0.009872 - 0.00006484S
Car	Yf = 0.010516 - 0.00006680S
Wagon	Yf = 0.002764 - 0.00001785S
Medium Bus	Yf = 0.002764 - 0.00001785S
Heavy Bus	Yf = 0.002059 - 0.00001308S
Truck	Yf = 0.001425 - 0.00000936S
Truck Trailer	Yf = 0.001425 - 0.00000936S

Where, Yf = Depreciation as per cent per 1,000km, equated as the Depreciable Value of the Vehicle.

(Source : "Quantification of Road User Saving" (Jan de Welle))

G. Interest

Motor Cycle	$Yg = 0.12 \times 0.5/1.25S$
Auto Rickshaw	$Yg = 0.12 \times 0.5/0.28S$
Car	$Yg = 0.12 \times 0.5/0.28S$
Wagon	$Yg = 0.12 \times 0.5/1.22S$
Medium Bus	$Yg = 0.12 \times 0.5/1.25S$
Heavy Bus	$Yg = 0.12 \times 0.5/1.30S$
Truck	$Yg = 0.12 \times 0.5/1.85S$
Truck Trailer	$Yg = 0.12 \times 0.5/1.62S$

Where, Yg = Interest as per cent of Vehicle value per 1,000km.
Rate of Interest fixed to Discount Rate (12% per annum.)

H. Equation of Wage

Per capita GNP in 1990	Rs. 8,977 (estimated)
Working hours (annual)	7 hr * 365 days = 2,555 hr/year
GNP per labour force per hour	Rs. 12.27

Different income levels were assumed for vehicle types.

Auto Rickshaw Driver	Average income of Rs. 10.0/hr (monthly Rs. 2,000, yearly Rs.24,000)
Bus/Truck Driver	Average income of Rs. 12.5/hr (monthly Rs. 2,500, yearly Rs.30,000)
Bus Conductor/ Truck Loader	Average income of Rs. 10.0/hr (monthly Rs. 2,000, yearly Rs.24,000)

As Auto Rickshaw is one-man driver, wages are for a driver only.
For Buses (including Mini-bus) and Trucks, Wages are for a driver and a conductor/loader.

Auto Rickshaw	$Yh = 1,000/S * 10$
Bus/Truck	$Yh = 1,000/S * (12.5+10)$

where, Yh = Wages per 1,000km of Vehicle operation

S = Operating Speed (km/hr)

Appendix Table 9.3.8 Economic Vehicle Operating Costs (Rs./1,000 km)

		Speed (km/hr)	Fuel	Oil	Tyre	Parts	Labour	Depre- ciation	Interest	Wages	Passenger Time	Total
MOTOR CYCLE	IMPROVED ROAD CONDITION	5	97.68	32.30	0.12	5.14	30.00	98.15	493.44	-	165.00	921.83
		10	89.15	30.93	0.18	5.14	30.00	94.82	246.72	-	82.50	579.44
		15	82.03	29.66	0.24	5.14	30.00	91.49	164.48	-	55.00	458.04
		20	76.34	28.48	0.31	5.14	30.00	88.15	123.36	-	41.25	393.03
		25	72.06	27.39	0.39	5.14	30.00	84.82	98.69	-	33.00	351.49
		30	69.19	26.39	0.48	5.14	30.00	81.49	82.24	-	27.50	322.43
		35	67.74	25.48	0.56	5.14	30.00	78.15	70.49	-	23.57	301.13
		40	67.71	24.67	0.66	5.14	30.00	74.82	61.68	-	20.63	285.31
		45	69.09	23.94	0.76	5.14	30.00	71.49	54.83	-	18.33	273.58
		50	71.89	23.31	0.87	5.14	30.00	68.16	49.34	-	16.50	265.21
		55	76.11	22.77	0.98	5.14	30.00	64.82	44.86	-	15.00	259.68
		60	81.74	22.32	1.10	5.14	30.00	61.49	41.12	-	13.75	256.66
		65	88.79	21.96	1.22	5.14	30.00	58.16	37.96	-	12.69	255.92
		70	97.25	21.70	1.35	5.14	30.00	54.83	35.25	-	11.79	257.31
		75	107.13	21.52	1.49	5.14	30.00	51.49	32.90	-	11.00	260.67
		80	118.43	21.44	1.63	5.14	30.00	48.16	30.84	-	10.31	265.95
		85	131.14	21.45	1.77	5.14	30.00	44.83	29.03	-	9.71	273.07
90	145.27	21.55	1.93	5.14	30.00	41.49	27.41	-	9.17	281.96		
UNIMPROVED ROAD CONDITION	UNIMPROVED ROAD CONDITION	5	107.44	32.30	0.23	8.84	30.00	123.67	493.44	-	165.00	960.92
		10	98.06	30.93	0.34	8.84	30.00	119.47	246.72	-	82.50	616.86
		15	90.24	29.66	0.47	8.84	30.00	115.27	164.48	-	55.00	493.96
		20	83.97	28.48	0.61	8.84	30.00	111.07	123.36	-	41.25	427.58
		25	79.26	27.39	0.76	8.84	30.00	106.87	98.69	-	33.00	384.81
		30	76.11	26.39	0.93	8.84	30.00	102.67	82.24	-	27.50	354.68
		35	74.52	25.48	1.10	8.84	30.00	98.47	70.49	-	23.57	332.47
		40	74.48	24.67	1.29	8.84	30.00	94.28	61.68	-	20.63	315.87
		45	76.00	23.94	1.48	8.84	30.00	90.08	54.83	-	18.33	303.50
		50	79.08	23.31	1.69	8.84	30.00	85.88	49.34	-	16.50	294.64
		55	83.72	22.77	1.91	8.84	30.00	81.68	44.86	-	15.00	288.78
		60	89.91	22.32	2.14	8.84	30.00	77.48	41.12	-	13.75	285.56
		65	97.67	21.96	2.38	8.84	30.00	73.28	37.96	-	12.69	284.78
		70	106.98	21.70	2.63	8.84	30.00	69.08	35.25	-	11.79	286.27
		75	117.84	21.52	2.90	8.84	30.00	64.88	32.90	-	11.00	289.86
		80	130.27	21.44	3.17	8.84	30.00	60.68	30.84	-	10.31	295.55
		85	144.25	21.45	3.46	8.84	30.00	56.48	29.03	-	9.71	303.22
90	159.79	21.55	3.76	8.84	30.00	52.28	27.41	-	9.17	312.80		

Appendix Table 9.3.8(2) Economic Vehicle Operating Costs (Rs./1,000 km)

		Speed (km/hr)	Fuel	Oil	Tyre	Parts	Labour	Depre- ciation	Interest	Wages	Passenger Time	Total
AUTO RIKSHAW	IMPROVED ROAD CONDITION	5	146.51	40.37	0.25	22.68	45.00	433.09	1,944.00	2,000.00	220.00	4,851.90
		10	133.72	38.66	0.37	22.68	45.00	418.38	972.00	1,000.00	110.00	2,740.81
		15	123.05	37.07	0.51	22.68	45.00	403.68	648.00	666.67	73.33	2,019.99
		20	114.51	35.60	0.66	22.68	45.00	388.97	486.00	500.00	60.50	1,653.92
		25	108.08	34.23	0.82	22.68	45.00	374.27	388.80	400.00	44.00	1,421.88
		30	103.79	32.99	1.00	22.68	45.00	359.56	324.00	333.33	36.67	1,259.02
		35	101.61	31.85	1.18	22.68	45.00	344.85	277.71	285.71	31.43	1,142.02
		40	101.57	30.83	1.38	22.68	45.00	330.15	243.00	250.00	27.50	1,052.11
		45	103.64	29.93	1.60	22.68	45.00	315.44	216.00	222.22	24.44	980.95
		50	107.84	29.14	1.82	22.68	45.00	300.74	194.40	200.00	22.00	923.62
		55	114.16	28.46	2.05	22.68	45.00	286.03	176.73	181.82	20.00	876.93
		60	122.61	27.90	2.30	22.68	45.00	271.33	162.00	166.67	18.33	838.82
		65	133.18	27.46	2.56	22.68	45.00	256.62	149.54	153.85	16.92	807.81
		70	145.88	27.12	2.83	22.68	45.00	241.91	138.86	142.86	15.71	782.85
		75	160.70	26.91	3.12	22.68	45.00	227.21	129.60	133.33	14.67	763.22
		80	177.64	26.80	3.42	22.68	45.00	212.50	121.50	125.00	13.75	748.29
		85	196.71	26.81	3.73	22.68	45.00	197.80	114.35	117.65	12.94	737.67
90	217.90	26.94	4.05	22.68	45.00	183.09	108.00	111.11	12.22	730.99		
UNIMPROVED ROAD CONDITION	UNIMPROVED ROAD CONDITION	5	161.17	40.37	0.48	39.01	45.00	545.69	1,944.00	2,000.00	220.00	4,995.72
		10	147.09	38.66	0.72	39.01	45.00	527.16	972.00	1,000.00	110.00	2,879.64
		15	135.36	37.07	0.99	39.01	45.00	508.63	648.00	666.67	73.33	2,154.06
		20	125.96	35.60	1.29	39.01	45.00	490.10	486.00	500.00	60.50	1,783.46
		25	118.89	34.23	1.60	39.01	45.00	471.57	388.80	400.00	44.00	1,543.10
		30	114.17	32.99	1.95	39.01	45.00	453.05	324.00	333.33	36.67	1,380.17
		35	111.78	31.85	2.31	39.01	45.00	434.52	277.71	285.71	31.43	1,259.32
		40	111.72	30.83	2.70	39.01	45.00	415.99	243.00	250.00	27.50	1,165.75
		45	114.00	29.93	3.11	39.01	45.00	397.46	216.00	222.22	24.44	1,091.17
		50	118.62	29.14	3.55	39.01	45.00	378.93	194.40	200.00	22.00	1,030.65
		55	125.58	28.46	4.01	39.01	45.00	360.40	176.73	181.82	20.00	981.01
		60	134.87	27.90	4.49	39.01	45.00	341.87	162.00	166.67	18.83	940.64
		65	146.50	27.46	5.00	39.01	45.00	323.34	149.54	153.85	16.92	906.62
		70	160.47	27.12	5.53	39.01	45.00	304.81	138.86	142.86	15.71	879.37
		75	176.77	26.91	6.08	39.01	45.00	286.28	129.60	133.33	14.67	857.65
		80	195.41	26.80	6.66	39.01	45.00	267.75	121.50	125.00	13.75	840.88
		85	216.38	26.81	7.26	39.01	45.00	249.22	114.35	117.67	12.94	828.64
90	239.69	25.94	7.89	39.01	45.00	230.69	108.00	111.11	12.22	820.55		

Appendix Table 9.3.8(3) Economic Vehicle Operating Costs (Rs./1,000 km)

		Speed (km/hr)	Fuel	Oil	Tyre	Parts	Labour	Depre- ciation	Interest	Wages	Passenger Time	Total
CAR	IMPROVED ROAD CONDITION	5	355.41	44.76	1.73	19.48	57.00	1,302.82	7,588.29	-	473.00	10,342.49
		10	323.12	40.92	2.62	19.48	57.00	1,743.69	3,794.14	-	236.50	6,217.47
		15	279.98	37.49	3.59	19.48	57.00	1,684.55	2,329.43	-	157.67	4,769.19
		20	273.98	34.47	4.65	19.48	57.00	1,625.41	1,897.07	-	118.25	4,030.31
		25	257.11	31.86	5.80	19.48	57.00	1,566.27	1,517.66	-	94.60	3,549.78
		30	245.39	29.66	7.03	19.48	57.00	1,507.13	1,264.71	-	78.83	3,209.23
		35	238.81	27.88	8.35	19.48	57.00	1,448.00	1,084.04	-	67.57	2,951.13
		40	237.38	26.51	9.75	19.48	57.00	1,388.86	948.54	-	59.13	2,746.65
		45	241.08	25.55	11.24	19.48	57.00	1,329.72	843.14	-	52.56	2,578.87
		50	249.92	25.01	12.82	19.48	57.00	1,270.58	758.83	-	47.30	2,440.94
		55	263.91	24.87	14.48	19.48	57.00	1,211.44	689.84	-	43.00	2,324.02
		60	283.04	25.15	16.23	19.48	57.00	1,152.31	632.36	-	39.42	2,224.99
		65	307.31	25.84	18.06	19.48	57.00	1,093.17	583.71	-	36.38	2,140.95
		70	336.72	26.94	19.98	19.48	57.00	1,034.03	542.02	-	33.79	2,069.96
		75	371.27	28.46	21.99	19.48	57.00	974.89	505.89	-	31.53	2,010.51
		80	410.96	30.39	24.08	19.48	57.00	915.75	474.27	-	29.56	1,961.49
		85	455.80	32.72	26.25	19.48	57.00	856.62	446.37	-	26.88	1,921.12
		90	505.78	35.48	28.52	19.48	57.00	797.48	421.57	-	26.28	1,891.59
	UNIMPROVED ROAD CONDITION	5	390.95	44.76	3.37	33.50	57.00	2,271.56	7,588.29	-	473.00	10,862.43
		10	355.44	40.92	5.10	33.50	57.00	2,197.05	3,794.14	-	236.50	6,719.65
		15	307.98	37.49	7.00	33.50	57.00	2,122.53	2,529.43	-	157.67	5,252.60
		20	301.37	34.97	9.07	33.50	57.00	2,048.02	1,897.07	-	118.25	4,498.75
		25	282.83	31.86	11.31	33.50	57.00	1,973.50	1,517.66	-	94.60	4,002.26
		30	269.93	29.66	13.71	33.50	57.00	1,898.99	1,264.71	-	78.83	3,646.33
		35	262.70	27.88	16.28	33.50	57.00	1,824.48	1,084.04	-	67.57	3,373.45
		40	261.11	26.51	19.02	33.50	57.00	1,749.96	948.54	-	59.13	3,154.77
		45	265.19	25.55	21.92	33.50	57.00	1,675.45	843.14	-	52.56	2,974.01
		50	274.92	25.01	24.99	33.50	57.00	1,600.93	758.83	-	47.30	2,822.48
		55	290.30	24.87	28.24	33.50	57.00	1,526.42	689.84	-	43.00	2,693.17
		60	311.34	25.15	31.64	33.50	57.00	1,451.91	632.36	-	39.42	2,582.32
		65	338.04	25.84	35.22	33.50	57.00	1,377.39	583.71	-	36.38	2,487.08
		70	370.39	26.94	38.96	33.50	57.00	1,302.88	542.02	-	33.79	2,405.48
		75	408.40	28.46	42.87	33.50	57.00	1,228.36	505.89	-	31.53	2,336.01
		80	452.06	30.39	46.95	33.50	57.00	1,153.85	474.27	-	29.56	2,277.58
		85	501.38	32.72	51.19	33.50	57.00	1,079.34	446.37	-	26.88	2,228.38
		90	556.35	35.48	55.61	33.50	57.00	1,004.82	421.57	-	26.28	2,190.61

Appendix Table 9.3.8(4) Economic Vehicle Operating Costs (Rs./1,000 km)

		Speed (km/hr)	Fuel	Oil	Tyre	Parts	Labour	Depre- ciation	Interest	Wages	Passenger Time	Total
WAGON	IMPROVED ROAD CONDITION	5	364.53	55.95	9.10	15.78	274.50	383.77	1,411.28	4,500.00	770.00	7,784.91
		10	333.40	51.15	9.84	15.78	274.50	370.97	705.64	2,250.00	385.00	4,396.28
		15	305.84	46.86	10.90	15.78	274.50	358.16	470.43	1,500.00	256.67	3,239.14
		20	281.85	43.08	12.27	15.78	274.50	345.36	352.82	1,125.00	192.50	2,643.16
		25	261.43	39.82	13.97	15.78	274.50	332.55	282.26	900.00	154.00	2,274.31
		30	244.58	37.08	15.97	15.78	274.50	319.75	235.21	750.00	128.33	2,021.20
		35	231.29	34.85	18.30	15.78	274.50	306.94	201.64	642.86	110.00	1,836.16
		40	221.57	33.14	20.94	15.78	274.50	294.13	176.41	562.50	96.25	1,695.22
		45	215.42	31.94	23.91	15.78	274.50	281.33	156.81	500.00	85.56	1,585.25
		50	212.84	31.26	27.18	15.78	274.50	268.52	141.13	450.00	77.00	1,498.21
		55	213.83	31.09	30.78	15.78	274.50	255.72	128.30	409.09	70.00	1,429.09
		60	218.38	31.44	34.69	15.78	274.50	242.91	117.61	375.00	64.17	1,347.48
		65	226.50	32.30	38.92	15.78	274.50	230.11	108.56	346.15	59.23	1,332.05
		70	238.19	33.68	43.46	15.78	274.50	217.30	100.81	321.43	55.00	1,300.15
		75	253.45	35.57	48.32	15.78	274.50	204.49	94.09	300.00	51.33	1,277.53
		80	272.28	37.98	53.50	15.78	274.50	191.69	88.20	281.25	48.13	1,263.31
		85	294.67	40.91	59.00	15.78	274.50	178.88	83.02	264.71	45.29	1,256.76
		90	320.64	44.35	64.81	15.78	274.50	166.08	78.40	250.00	42.78	1,257.34
	UNIMPROVED ROAD CONDITION	5	400.98	55.95	17.74	27.15	274.50	483.55	1,411.28	4,500.00	770.00	7,941.15
		10	366.74	51.15	19.19	27.15	274.50	467.42	705.64	2,250.00	385.00	4,546.79
		15	336.43	46.86	21.25	27.15	274.50	451.28	470.43	1,500.00	256.67	3,384.57
		20	310.04	43.08	23.93	27.15	274.50	435.15	352.82	1,125.00	192.50	2,784.17
		25	287.57	39.82	27.23	27.15	274.50	419.01	282.26	900.00	154.00	2,411.54
		30	269.03	37.08	31.15	27.15	274.50	402.88	235.21	750.00	128.33	2,155.33
		35	254.42	34.85	35.69	27.15	274.50	386.74	201.61	642.86	110.00	1,967.82
		40	243.73	33.14	40.84	27.15	274.50	370.61	176.41	562.50	96.25	1,825.13
		45	236.96	31.94	46.62	27.15	274.50	354.47	156.81	500.00	85.56	1,714.01
		50	234.12	31.26	53.01	27.15	274.50	338.34	141.13	450.00	77.00	1,626.51
		55	235.21	31.09	60.02	27.15	274.50	322.20	128.30	409.09	70.00	1,557.56
		60	240.22	31.44	67.64	27.15	274.50	306.07	117.61	375.00	64.17	1,503.80
		65	249.15	32.30	75.89	27.15	274.50	289.93	108.56	346.15	59.23	1,462.86
		70	262.01	33.68	84.75	27.15	274.50	273.80	100.81	321.43	55.00	1,433.13
		75	278.80	35.57	94.23	27.15	274.50	257.66	94.09	300.00	51.33	1,413.33
		80	299.51	37.98	104.33	27.15	274.50	241.53	88.20	281.25	48.13	1,402.58
		85	324.14	40.91	115.05	27.15	274.50	225.39	83.02	264.71	45.29	1,400.16
		90	352.70	44.35	126.38	27.15	274.50	209.26	78.40	250.00	42.78	1,405.52

Appendix Table 9.3.8(5) Economic Vehicle Operating Costs (Rs./1,000 km)

		Speed (km/hr)	Fuel	Oil	Tyre	Parts	Labour	Depre- ciation	Interest	Wages	Passenger Time	Total
MEDIUM BUS	IMPROVED ROAD CONDITION	5	437.44	67.14	13.71	26.83	274.50	652.45	2,431.73	4,500.00	1,375.00	9,778.80
		10	400.08	61.38	14.83	26.83	274.50	630.68	1,170.86	2,250.00	687.50	5,516.66
		15	367.01	56.23	16.42	26.83	274.50	608.91	780.58	1,500.00	458.33	4,088.81
		20	338.21	51.70	18.50	26.83	274.50	587.14	585.43	1,125.00	343.75	3,351.06
		25	313.72	47.79	21.05	26.83	274.50	565.37	468.35	900.00	275.00	2,892.61
		30	293.49	44.50	24.07	26.83	274.50	543.60	390.29	750.00	229.17	2,576.45
		35	277.55	41.82	27.58	26.83	274.50	521.83	334.53	642.86	196.43	2,343.93
		40	265.89	39.77	31.56	26.83	274.50	500.06	292.72	562.50	171.88	2,165.71
		45	258.51	38.33	36.03	26.83	274.50	478.29	260.19	500.00	152.78	2,025.46
		50	255.41	37.51	40.97	26.83	274.50	456.51	234.17	450.00	137.50	1,913.40
		55	256.59	37.31	46.38	26.83	274.50	434.74	212.88	409.09	125.00	1,823.32
		60	262.06	37.73	52.28	26.83	274.50	412.97	195.14	375.00	114.58	1,751.09
		65	271.80	38.76	58.65	26.83	274.50	391.20	180.13	346.15	105.77	1,693.79
		70	285.83	40.42	65.50	26.83	274.50	369.43	167.27	321.43	98.21	1,649.42
		75	304.14	42.69	72.83	26.83	274.50	347.66	156.12	300.00	91.67	1,616.44
80	326.73	45.58	80.63	26.83	274.50	325.89	146.36	281.25	85.94	1,593.71		
85	353.61	49.09	88.92	26.83	274.50	304.12	137.75	264.71	80.88	1,580.41		
90	384.76	53.21	97.68	26.83	274.50	282.35	130.10	250.00	76.39	1,575.82		
	UNIMPROVED ROAD CONDITION	5	481.18	67.14	26.73	46.15	274.50	822.09	2,431.73	4,500.00	1,375.00	10,024.52
		10	440.09	61.38	28.91	46.15	274.50	794.66	1,170.86	2,250.00	687.50	5,754.05
		15	403.71	56.23	32.02	46.15	274.50	767.23	780.58	1,500.00	458.33	4,318.75
		20	372.05	51.70	36.07	46.15	274.50	739.80	585.43	1,125.00	343.75	3,574.45
		25	345.09	47.79	41.04	46.15	274.50	712.36	468.35	900.00	275.00	3,110.28
		30	322.84	44.50	46.95	46.15	274.50	684.93	390.29	750.00	229.17	2,789.33
		35	305.30	41.82	53.78	46.15	274.50	657.50	334.53	642.86	196.43	2,522.87
		40	292.48	39.77	61.55	46.15	274.50	630.07	292.72	562.50	171.88	2,371.62
		45	284.36	38.33	70.25	46.15	274.50	602.64	260.19	500.00	152.78	2,229.20
		50	280.95	37.51	79.88	46.15	274.50	575.21	234.17	450.00	137.50	2,115.88
		55	282.25	37.31	90.45	46.15	274.50	547.78	212.88	409.09	125.00	2,025.41
		60	288.26	37.73	101.94	46.15	274.50	520.35	195.14	375.00	114.58	1,953.65
		65	298.98	38.76	114.37	46.15	274.50	492.92	180.13	346.15	105.77	1,897.73
		70	314.41	40.42	127.72	46.15	274.50	465.48	167.27	321.43	98.21	1,855.59
		75	334.56	42.69	142.01	46.15	274.50	438.05	156.12	300.00	91.67	1,825.75
80	359.41	45.58	157.23	46.15	274.50	410.62	146.36	281.25	85.94	1,807.04		
85	388.97	49.09	173.38	46.15	274.50	383.19	137.75	264.71	80.88	1,798.62		
90	423.24	53.21	190.47	46.15	274.50	355.76	130.10	250.00	76.39	1,799.82		

Appendix Table 9.3.8(6) Economic Vehicle Operating Costs (Rs./1,000 km)

		Speed (km/hr)	Fuel	Oil	Tyre	Parts	Labour	Depre- ciation	Interest	Wages	Passenger Time	Total
HEAVY BUS	IMPROVED ROAD CONDITION	5	932.76	157.59	89.83	61.05	328.50	676.13	3,130.62	4,500.00	2,024.00	11,900.48
		10	848.89	143.85	85.18	61.05	328.50	653.95	1,565.31	2,250.00	1,012.00	6,948.73
		15	776.45	131.46	83.96	61.05	328.50	631.77	1,043.54	1,500.00	674.67	5,231.40
		20	715.44	120.42	86.14	61.05	328.50	609.59	782.65	1,125.00	506.00	4,334.79
		25	665.87	110.74	91.74	61.05	328.50	587.41	626.12	900.00	404.80	3,776.23
		30	627.73	104.83	100.75	61.05	328.50	565.23	521.77	750.00	337.33	3,397.19
		35	601.02	95.42	113.18	61.05	328.50	543.05	447.23	642.86	289.14	3,121.45
		40	585.74	89.78	129.02	61.05	328.50	520.87	391.33	562.50	253.00	2,921.79
		45	581.90	85.50	148.28	61.05	328.50	498.69	347.85	500.00	224.89	2,776.66
		50	589.48	82.57	170.95	61.05	328.50	476.51	313.06	450.00	202.40	2,674.52
		55	608.50	80.99	197.03	61.05	328.50	454.33	284.60	409.09	184.00	2,608.09
		60	638.95	80.76	226.52	61.05	328.50	432.14	260.88	375.00	168.67	2,572.47
		65	680.84	81.88	259.43	61.05	328.50	409.96	240.82	346.15	155.69	2,564.32
		70	734.15	84.36	295.76	61.05	328.50	387.78	223.62	321.43	144.57	2,581.22
		75	798.90	88.18	335.50	61.05	328.50	365.60	208.71	300.00	134.44	2,620.88
80	875.08	93.36	378.65	61.05	328.50	343.42	195.66	281.25	126.50	2,683.47		
85	962.69	99.88	425.21	61.05	328.50	321.24	184.15	264.71	119.06	2,766.49		
90	1,061.73	107.76	475.19	61.05	328.50	299.06	173.92	250.00	112.44	2,869.63		
	UNIMPROVED ROAD CONDITION	5	1,026.04	157.59	98.81	76.92	328.50	851.92	3,130.62	4,500.00	2,024.00	12,194.40
		10	933.78	143.85	93.70	76.92	328.50	823.98	1,565.31	2,250.00	1,012.00	7,228.04
		15	854.10	131.46	92.35	76.92	328.50	796.03	1,043.54	1,500.00	674.67	5,497.57
		20	786.99	120.42	94.76	76.92	328.50	768.08	782.65	1,125.00	506.00	4,589.32
		25	732.46	110.74	100.92	76.92	328.50	740.13	626.12	900.00	404.80	4,020.59
		30	690.50	104.83	110.83	76.92	328.50	712.19	521.77	750.00	337.33	3,632.87
		35	661.12	95.42	124.50	76.92	328.50	684.24	447.23	642.86	289.14	3,349.93
		40	644.32	89.78	141.93	76.92	328.50	656.29	391.33	562.50	253.00	3,144.57
		45	640.09	85.50	163.11	76.92	328.50	628.34	347.85	500.00	224.89	2,995.20
		50	648.43	82.57	188.04	76.92	328.50	600.40	313.06	450.00	202.40	2,890.32
		55	669.35	80.99	216.73	76.92	328.50	572.45	284.60	409.09	184.00	2,822.63
		60	702.85	80.76	249.18	76.92	328.50	544.50	260.88	375.00	168.67	2,787.26
		65	748.92	81.88	285.38	76.92	328.50	516.56	240.82	346.15	155.69	2,780.82
		70	807.57	84.36	325.33	76.92	328.50	488.61	223.62	321.43	144.57	2,800.91
		75	878.79	88.18	369.04	76.92	328.50	460.66	208.71	300.00	134.33	2,845.13
80	962.59	93.36	416.51	76.92	328.50	432.71	195.66	281.25	126.50	2,914.00		
85	1,058.96	99.88	467.73	76.92	328.50	404.77	184.15	264.71	119.06	3,004.68		
90	1,167.91	107.76	522.71	76.92	328.50	376.82	173.92	250.00	112.44	3,116.98		

Appendix Table 9.3.8(7) Economic Vehicle Operating Costs (Rs./1,000 km)

	Speed (km/hr)	Fuel	Oil	Tyre	Parts	Labour	Depre- ciation	Interest	Wages	Passenger Time	Total
TRUCK (2 AXLE) IMPROVED ROAD CONDITION	5	2,481.35	173.55	89.83	93.77	328.50	717.96	3,379.08	4,500.00	-	11,764.04
	10	2,142.76	158.33	85.18	93.77	328.50	693.58	1,689.54	2,250.00	-	7,441.66
	15	1,837.12	144.61	83.96	93.77	328.50	669.20	1,126.36	1,500.00	-	5,783.52
	20	1,564.42	132.39	86.14	93.77	328.50	644.82	844.77	1,125.00	-	4,819.81
	25	1,324.66	121.67	91.74	93.77	328.50	620.44	675.81	900.00	-	4,156.59
	30	1,117.86	112.45	100.75	93.77	328.50	596.06	563.18	750.00	-	3,662.57
	35	943.99	104.73	113.18	93.77	328.50	571.68	482.72	642.86	-	3,281.43
	40	803.08	98.51	129.02	93.77	328.50	547.30	422.38	562.50	-	2,985.06
	45	695.10	93.79	148.28	93.77	328.50	522.92	375.45	500.00	-	2,757.81
	50	620.08	90.57	170.95	93.77	328.50	498.54	337.91	450.00	-	2,590.32
	55	578.00	88.85	197.03	93.77	328.50	474.16	307.19	409.09	-	2,476.59
	60	568.86	88.63	226.52	93.77	328.50	449.78	281.59	375.00	-	2,412.65
	65	592.67	89.91	259.43	93.77	328.50	425.40	259.93	346.15	-	2,395.76
	70	649.43	92.69	295.76	93.77	328.50	401.02	241.36	321.43	-	2,423.96
	75	739.13	96.97	335.50	93.77	328.50	376.64	225.27	300.00	-	2,495.78
	80	861.78	102.75	378.65	93.77	328.50	352.26	211.19	281.25	-	2,610.15
85	1,017.37	110.13	425.21	93.77	328.50	327.88	198.77	264.71	-	2,766.34	
90	1,205.91	118.81	475.19	93.77	328.50	303.50	187.73	250.00	-	2,963.41	
UNIMPROVED ROAD CONDITION	5	2,729.49	173.55	98.81	118.15	328.50	904.63	3,379.08	4,500.00	-	12,232.21
	10	2,357.04	158.33	93.70	118.15	328.50	873.91	1,689.54	2,250.00	-	7,869.17
	15	2,020.83	144.61	92.35	118.15	328.50	843.19	1,126.36	1,500.00	-	6,173.99
	20	1,720.86	132.39	94.76	118.15	328.50	812.47	844.77	1,125.00	-	5,176.90
	25	1,457.13	121.67	100.92	118.15	328.50	781.75	675.81	900.00	-	4,483.93
	30	1,229.64	122.45	110.83	118.15	328.50	751.04	563.18	750.00	-	3,973.79
	35	1,038.39	104.73	124.50	118.15	328.50	720.32	482.72	642.86	-	3,560.17
	40	883.38	98.51	141.93	118.15	328.50	689.60	422.38	562.50	-	3,244.95
	45	764.61	93.79	163.11	118.15	328.50	658.88	375.45	500.00	-	3,002.49
	50	682.09	90.57	188.04	118.15	328.50	628.16	337.91	450.00	-	2,823.42
	55	635.80	88.85	216.73	118.15	328.50	597.44	307.19	409.09	-	2,701.75
	60	625.75	88.63	249.18	118.15	328.50	566.72	281.59	375.00	-	2,633.52
	65	651.94	89.91	285.38	118.15	328.50	536.00	259.93	346.15	-	2,618.96
	70	714.37	92.69	325.33	118.15	328.50	505.28	241.36	321.43	-	2,647.11
	75	813.04	96.97	369.04	118.15	328.50	474.57	225.27	300.00	-	2,725.54
	80	947.95	102.75	416.51	118.15	328.50	443.85	211.19	281.25	-	2,850.15
85	1,119.11	110.03	467.73	118.15	328.50	413.13	198.77	264.71	-	3,020.13	
90	1,326.50	118.81	522.71	118.15	328.50	382.41	187.73	250.00	-	3,234.81	

Appendix Table 9.3.8(8) Economic Vehicle Operating Costs (Rs./1,000 km)

	Speed (km/hr)	Fuel	Oil	Tyre	Parts	Labour	Depre- ciation	Interest	Wages	Passenger Time	Total
TRUCK TRAILER IMPROVED ROAD CONDITION	5	3,722.03	260.32	256.71	169.15	328.50	1,295.12	5,960.89	4,500.00	-	17,492.72
	10	3,214.15	237.50	243.44	169.15	328.50	1,251.14	3,480.44	2,250.00	-	11,174.32
	15	2,755.68	216.92	239.93	169.15	328.50	1,207.16	2,320.30	1,500.00	-	8,737.64
	20	2,346.63	198.59	246.18	169.15	328.50	1,163.19	1,740.22	1,125.00	-	7,317.46
	25	1,987.00	182.51	262.18	169.15	328.50	1,119.21	1,392.18	900.00	-	6,340.73
	30	1,676.78	168.68	287.94	169.15	328.50	1,075.23	1,160.15	750.00	-	5,616.43
	35	1,415.99	157.10	323.46	169.15	328.50	1,031.25	944.41	642.86	-	5,012.72
	40	1,204.61	147.77	368.73	169.15	328.50	987.27	870.11	562.50	-	4,638.64
	45	1,042.66	140.69	423.75	169.15	328.50	943.29	773.43	500.00	-	4,321.47
	50	930.12	135.86	488.54	169.15	328.50	899.31	696.09	450.00	-	4,097.57
	55	866.99	133.28	563.08	169.15	328.50	855.33	632.81	409.09	-	3,958.23
	60	853.29	132.95	647.37	169.15	328.50	811.35	580.07	375.00	-	3,897.68
	65	889.01	134.87	741.42	169.15	328.50	767.38	535.45	346.15	-	3,911.93
	70	974.14	139.04	845.23	169.15	328.50	723.40	497.21	321.43	-	3,998.10
	75	1,108.69	145.46	958.79	169.15	328.50	679.42	464.06	300.00	-	4,154.07
	80	1,292.66	154.13	1,082.11	169.15	328.50	635.44	435.06	281.25	-	4,378.30
85	1,526.05	165.05	1,215.18	169.15	328.50	591.46	409.46	264.71	-	4,669.56	
90	1,808.86	178.22	1,358.01	169.15	328.50	547.48	386.72	250.00	-	5,026.94	
UNIMPROVED ROAD CONDITION	5	4,094.24	260.32	282.38	213.13	328.50	1,631.85	6,960.89	4,500.00	-	18,271.31
	10	3,535.56	237.50	267.79	213.13	328.50	1,576.44	3,480.44	2,250.00	-	11,889.36
	15	3,031.25	216.92	263.93	213.13	328.50	1,521.03	2,320.30	1,500.00	-	9,395.06
	20	2,581.29	198.59	270.80	213.13	328.50	1,465.61	1,740.22	1,125.00	-	7,923.14
	25	2,185.70	182.51	288.40	213.13	328.50	1,410.20	1,392.18	900.00	-	6,900.62
	30	1,844.46	168.68	316.73	213.13	328.50	1,354.79	1,160.15	750.00	-	6,136.44
	35	1,557.59	157.10	355.80	213.13	328.50	1,299.37	994.41	642.86	-	5,548.76
	40	1,325.07	147.77	405.60	213.13	328.50	1,243.96	870.11	562.50	-	5,096.64
	45	1,146.92	140.69	466.13	213.13	328.50	1,188.55	773.43	500.00	-	4,757.35
	50	1,023.13	135.86	537.39	213.13	328.50	1,133.13	696.09	450.00	-	4,517.23
	55	953.69	133.28	619.38	213.13	328.50	1,077.72	632.81	409.09	-	4,367.60
	60	938.62	132.95	712.11	213.13	328.50	1,022.31	580.07	375.00	-	4,302.69
	65	977.91	134.87	815.56	213.13	328.50	966.89	535.45	346.15	-	4,318.46
	70	1,071.56	139.04	929.75	213.13	328.50	911.48	497.21	321.43	-	4,412.10
	75	1,219.56	145.46	1,054.67	213.13	328.50	856.07	464.06	300.00	-	4,581.45
	80	1,421.93	154.13	1,190.32	213.13	328.50	800.65	435.06	281.25	-	4,824.97
85	1,678.66	165.05	1,336.70	213.13	328.50	745.24	409.46	264.71	-	5,141.45	
90	1,989.75	178.22	1,493.82	213.13	328.50	689.83	386.72	250.00	-	5,529.97	

APPENDIX TABLE 9.3.9.(1) COST/BENEFIT FLOW
ALTERNATIVE -1- (LRT + HRT)

(unit : million Rupees)

YEAR	COST				BENEFIT					
	Initial Investment			O/M and Add. Invest.	TOTAL	VOC Savings		TTC Savings		TOTAL
	Roads	LRT	HRT			Public	Private	Public	Private	
1991	515.04	-	-	-	515.04	-	-	-	-	-
1992	515.04	-	-	-	515.04	-	-	-	-	-
1993	515.04	-	-	-	515.04	-	-	-	-	-
1994	515.04	-	-	-	515.04	-	-	-	-	-
1995	515.04	-	-	-	515.04	-	-	-	-	-
1996	515.04	-	-	-	515.04	-	137.78	-	47.89	189.67
1997	515.04	-	-	-	515.04	-	275.55	-	95.79	371.34
1998	515.04	-	-	-	515.04	-	413.33	-	143.68	557.01
1999	515.04	-	-	-	515.04	-	551.11	-	191.57	742.68
2000	515.04	-	-	-	515.04	-	688.88	-	239.47	928.35
2001	515.04	-	-	-	515.04	-	826.66	-	287.36	1,114.02
2002	515.04	-	-	-	515.04	-	964.44	-	335.25	1,299.69
2003	515.04	-	-	-	515.04	-	1,102.21	-	383.64	1,485.35
2004	515.04	-	-	-	515.04	-	1,239.99	-	431.04	1,671.03
2005	515.04	-	-	-	515.04	-	1,377.77	-	478.93	1,856.70
2006	515.04	929.80	285.60	-	1,730.44	-	1,515.54	-	526.82	2,042.36
2007	515.04	929.80	285.60	-	1,730.44	-	1,653.32	-	574.72	2,228.04
2008	515.04	929.80	285.60	-	1,730.44	-	1,791.10	-	622.61	2,413.71
2009	515.04	929.80	285.60	-	1,730.44	-	1,928.87	-	670.50	2,599.37
2010	515.04	929.80	285.60	-	1,730.44	-	2,066.65	-	718.40	2,785.05
2011	-	-	-	170.91	170.91	354.56	2,204.43	366.93	766.29	3,692.21
2012	-	-	-	170.91	170.91	365.20	2,270.56	377.94	789.28	3,802.98
2013	-	-	-	170.91	170.91	376.15	2,338.68	389.28	812.96	3,917.07
2014	-	-	-	170.91	170.91	387.44	2,408.84	400.95	837.35	4,034.58
2015	-	-	-	170.91	170.91	399.06	2,481.11	412.98	862.47	4,155.62
2016	-	-	-	170.91	170.91	411.03	2,555.54	425.37	888.34	4,280.28
2017	-	-	-	1,428.70	1,428.70	423.36	2,632.20	438.13	914.99	4,408.68
2018	-	-	-	170.91	170.91	436.06	2,711.17	451.28	942.44	4,540.95
2019	-	-	-	170.91	170.91	449.15	2,792.51	464.82	970.71	4,677.19
2020	-	-	-	170.91	170.91	462.62	2,876.28	478.76	999.83	4,817.49
2021	-	-	-	170.91	170.91	476.50	2,962.57	493.12	1,029.83	4,962.02
2022	-	-	-	170.91	170.91	490.79	3,051.45	507.92	1,060.72	5,110.88
2023	-	-	-	170.91	170.91	505.52	3,142.99	523.15	1,092.55	5,264.21
2024	-	-	-	1,428.70	1,428.70	520.68	3,237.28	538.85	1,125.32	5,422.13
2025	-	-	-	170.91	170.91	536.30	3,334.40	555.01	1,159.08	5,584.79
2026	-	-	-	170.91	170.91	552.39	3,434.43	571.66	1,193.85	5,752.34
2027	-	-	-	170.91	170.91	568.96	3,537.46	588.81	1,229.67	5,924.90
2028	-	-	-	170.91	170.91	586.03	3,643.59	606.48	1,266.56	6,102.66
2029	-	-	-	170.91	170.91	603.61	3,752.89	624.67	1,304.56	6,285.73
2030	-	-	-	170.91	170.91	621.72	3,865.48	643.41	1,343.69	6,474.30
2031	-	-	-	1,428.70	1,428.70	640.37	3,981.45	662.72	1,384.00	6,668.54
2032	-	-	-	170.91	170.91	659.59	4,100.89	682.60	1,425.53	6,868.61
2033	-	-	-	170.91	170.91	679.39	4,223.92	703.08	1,468.29	7,074.68
2034	-	-	-	170.91	170.91	699.75	4,350.63	724.17	1,512.34	7,286.89
2035	-	-	-	170.91	170.91	720.75	4,481.15	745.89	1,557.71	7,505.50
2036	-	-	-	170.91	170.91	742.37	4,615.59	768.27	1,604.44	7,730.67
2037	-	-	-	170.91	170.91	764.64	4,754.05	791.32	1,652.57	7,962.58
2038	-	-	-	1,428.70	1,428.70	787.58	4,896.68	815.06	1,702.15	8,201.47
2039	-	-	-	170.91	170.91	811.21	5,043.58	839.51	1,753.22	8,447.51
2040	-	-	-	170.91	170.91	835.54	5,194.88	864.69	1,805.81	8,700.92
B/C Ratio	1.6756									
NET PRESENT VALUE (NPV)	3,066.11 million Rupees									
ECONOMIC INTERNAL RATE OF RETURN (EIRR)	17.60 %									

APPENDIX TABLE 9.3.9.(2) COST/BENEFIT FLOW

ALTERNATIVE -2- (BUSWAY + HRT)

(unit : million Rupees)

YBAR	COST					BENEFIT				
	Initial Investment			O/M Cost and Add. Invest.	TOTAL	VOC Savings		TTC Savings		TOTAL
	Roads	BUSWAY	HRT			Public	Private	Public	Private	
1991	515.04	-	-	-	515.04	-	-	-	-	-
1992	515.04	-	-	-	515.04	-	-	-	-	-
1993	515.04	-	-	-	515.04	-	-	-	-	-
1994	515.04	-	-	-	515.04	-	-	-	-	-
1995	515.04	-	-	-	515.04	-	-	-	-	-
1996	515.04	-	-	-	515.04	-	137.78	-	24.68	162.46
1997	515.04	-	-	-	515.04	-	275.55	-	49.36	324.91
1998	515.04	-	-	-	515.04	-	413.33	-	74.04	487.37
1999	515.04	-	-	-	515.04	-	551.11	-	98.72	649.83
2000	515.04	-	-	-	515.04	-	688.88	-	123.40	812.28
2001	515.04	-	-	-	515.04	-	826.66	-	148.08	974.74
2002	515.04	-	-	-	515.04	-	964.44	-	172.76	1,137.20
2003	515.04	-	-	-	515.04	-	1,102.21	-	197.44	1,299.65
2004	515.04	-	-	-	515.04	-	1,239.99	-	222.11	1,462.10
2005	515.04	-	-	-	515.04	-	1,377.77	-	246.79	1,624.56
2006	515.04	823.80	285.60	-	1,624.44	-	1,515.54	-	271.47	1,787.01
2007	515.04	823.80	285.60	-	1,624.44	-	1,653.32	-	296.15	1,949.47
2008	515.04	823.80	285.60	-	1,624.44	-	1,791.10	-	320.83	2,111.93
2009	515.04	823.80	285.60	-	1,624.44	-	1,928.87	-	345.51	2,274.38
2010	515.04	823.80	285.60	-	1,624.44	-	2,066.65	-	370.19	2,436.84
2011	-	-	-	220.18	220.18	296.97	2,204.43	189.10	394.87	3,085.37
2012	-	-	-	220.18	220.18	305.88	2,270.56	194.77	406.72	3,177.94
2013	-	-	-	220.18	220.18	315.06	2,338.68	200.62	418.92	3,273.28
2014	-	-	-	220.18	220.18	324.51	2,408.84	206.63	431.49	3,371.47
2015	-	-	-	220.18	220.18	334.24	2,481.11	212.83	444.43	3,472.61
2016	-	-	-	220.18	220.18	344.27	2,555.54	219.22	457.76	3,576.79
2017	-	-	-	1,477.97	1,477.97	354.60	2,632.20	225.80	471.50	3,684.10
2018	-	-	-	220.18	220.18	365.24	2,711.17	232.57	485.64	3,794.62
2019	-	-	-	220.18	220.18	376.19	2,792.51	239.55	500.21	3,908.46
2020	-	-	-	409.68	409.68	387.48	2,876.28	246.73	515.22	4,025.71
2021	-	-	-	220.18	220.18	399.10	2,962.57	254.13	530.67	4,146.47
2022	-	-	-	220.18	220.18	411.08	3,051.45	261.76	546.59	4,270.88
2023	-	-	-	220.18	220.18	423.41	3,142.99	269.61	562.99	4,399.00
2024	-	-	-	1,477.97	1,477.97	436.11	3,237.28	277.70	579.88	4,530.97
2025	-	-	-	220.18	220.18	449.19	3,334.40	286.03	597.28	4,666.90
2026	-	-	-	220.18	220.18	462.67	3,434.43	294.61	615.19	4,806.90
2027	-	-	-	220.18	220.18	476.55	3,537.46	303.45	633.65	4,951.11
2028	-	-	-	220.18	220.18	490.85	3,643.59	312.55	652.66	5,099.65
2029	-	-	-	220.18	220.18	505.57	3,752.89	321.93	672.24	5,252.63
2030	-	-	-	409.68	409.68	520.74	3,865.48	331.59	692.41	5,410.22
2031	-	-	-	1,477.97	1,477.97	536.36	3,981.45	341.54	713.18	5,572.53
2032	-	-	-	220.18	220.18	552.45	4,100.89	351.78	734.57	5,739.69
2033	-	-	-	220.18	220.18	569.03	4,223.92	362.34	756.61	5,911.90
2034	-	-	-	220.18	220.18	586.10	4,350.63	373.21	779.31	6,089.25
2035	-	-	-	220.18	220.18	603.68	4,481.15	384.40	802.69	6,271.92
2036	-	-	-	220.18	220.18	621.79	4,615.59	395.93	826.77	6,460.08
2037	-	-	-	220.18	220.18	640.44	4,754.05	407.81	851.57	6,653.87
2038	-	-	-	1,477.97	1,477.97	659.66	4,896.68	420.05	877.12	6,853.51
2039	-	-	-	220.18	220.18	679.45	5,043.58	432.65	903.43	7,059.11
2040	-	-	-	409.68	409.68	699.83	5,194.88	445.63	930.54	7,270.88
B/C Ratio	1.4582									
NET PRESENT VALUE (NPV)	2,206.03 million Rupees									
ECONOMIC INTERNAL RATE OF RETURN (EIRR)	15.92 %									

APPENDIX TABLE 9.3.9.(3) COST/BENEFIT FLOW
ALTERNATIVE -3- (LRT ONLY)

(unit : million Rupees)

YEAR	COST				BENEFIT				TOTAL
	Initial Invest.	O/M Cost and Add. Invest.	TOTAL	VOC Savings		TTC Savings			
	Roads			LRT	Public	Private	Public	Private	
1991	515.04	-	-	515.04	-	-	-	-	-
1992	515.04	-	-	515.04	-	-	-	-	-
1993	515.04	-	-	515.04	-	-	-	-	-
1994	515.04	-	-	515.04	-	-	-	-	-
1995	515.04	-	-	515.04	-	-	-	-	-
1996	515.04	-	-	515.04	-	137.78	-	27.80	165.58
1997	515.04	-	-	515.04	-	275.55	-	55.60	331.15
1998	515.04	-	-	515.04	-	413.33	-	83.40	496.73
1999	515.04	-	-	515.04	-	551.11	-	111.20	662.31
2000	515.04	-	-	515.04	-	688.88	-	139.00	827.88
2001	515.04	-	-	515.04	-	826.66	-	166.80	993.46
2002	515.04	-	-	515.04	-	964.44	-	194.60	1,159.04
2003	515.04	-	-	515.04	-	1,102.21	-	222.41	1,324.62
2004	515.04	-	-	515.04	-	1,239.99	-	250.21	1,490.20
2005	515.04	-	-	515.04	-	1,377.77	-	278.01	1,655.78
2006	515.04	929.80	-	1,444.84	-	1,515.54	-	305.81	1,821.35
2007	515.04	929.80	-	1,444.84	-	1,653.32	-	333.61	1,986.93
2008	515.04	929.80	-	1,444.84	-	1,791.10	-	361.41	2,152.51
2009	515.04	929.80	-	1,444.84	-	1,928.87	-	389.21	2,318.08
2010	515.04	929.80	-	1,444.84	-	2,066.65	-	417.01	2,483.66
2011	-	-	78.29	78.29	275.00	2,204.43	213.18	444.81	3,137.42
2012	-	-	78.29	78.29	283.25	2,270.56	219.58	458.15	3,231.54
2013	-	-	78.29	78.29	291.75	2,338.68	226.16	471.90	3,328.49
2014	-	-	78.29	78.29	300.50	2,408.84	232.95	486.06	3,428.35
2015	-	-	78.29	78.29	309.51	2,481.11	239.94	500.64	3,531.20
2016	-	-	78.29	78.29	318.80	2,555.54	247.13	515.66	3,637.13
2017	-	1,336.08	78.29	1,336.08	328.36	2,632.20	254.55	531.13	3,746.24
2018	-	-	78.29	78.29	338.22	2,711.17	262.18	547.06	3,858.63
2019	-	-	78.29	78.29	348.36	2,792.51	270.05	563.47	3,974.39
2020	-	-	78.29	78.29	358.81	2,876.28	278.15	580.38	4,093.62
2021	-	-	78.29	78.29	369.58	2,962.57	286.50	597.79	4,216.44
2022	-	-	78.29	78.29	380.66	3,051.45	295.09	615.72	4,342.92
2023	-	-	78.29	78.29	392.08	3,142.99	303.94	634.19	4,473.20
2024	-	1,336.08	78.29	1,336.08	403.85	3,237.28	313.06	653.22	4,607.41
2025	-	-	78.29	78.29	415.96	3,334.40	322.45	672.82	4,745.63
2026	-	-	78.29	78.29	428.44	3,434.43	332.13	693.00	4,888.00
2027	-	-	78.29	78.29	441.29	3,537.46	342.09	713.79	5,034.63
2028	-	-	78.29	78.29	454.53	3,643.59	352.35	735.20	5,185.67
2029	-	-	78.29	78.29	468.17	3,752.89	362.92	757.26	5,341.24
2030	-	-	78.29	78.29	482.21	3,865.48	373.81	779.98	5,501.48
2031	-	1,336.08	78.29	1,336.08	496.68	3,981.45	385.03	803.38	5,666.54
2032	-	-	78.29	78.29	511.58	4,100.89	396.58	827.48	5,836.53
2033	-	-	78.29	78.29	526.93	4,223.92	408.47	852.30	6,011.62
2034	-	-	78.29	78.29	542.74	4,350.63	420.73	877.87	6,191.97
2035	-	-	78.29	78.29	559.02	4,481.15	433.35	904.21	6,377.73
2036	-	-	78.29	78.29	575.79	4,615.59	446.35	931.33	6,569.06
2037	-	-	78.29	78.29	593.06	4,754.05	459.74	959.27	6,766.12
2038	-	1,336.08	78.29	1,336.08	610.85	4,896.68	473.53	988.05	6,969.11
2039	-	-	78.29	78.29	629.18	5,043.58	487.74	1,017.69	7,178.19
2040	-	-	78.29	78.29	648.06	5,194.88	502.37	1,048.22	7,393.53
B/C Ratio				1.5445					
NET PRESENT VALUE (NPV)				2,519.88 million Rupees					
ECONOMIC INTERNAL RATE OF RETURN (EIRR)				16.482 %					

APPENDIX TABLE 9.3.9.(4) COST/BENEFIT FLOW

ALTERNATIVE -4- (BUSWAY ONLY)

(unit : million Rupees)

YEAR	COST				BENEFIT				
	Initial	Invest.	O/M Cost and	TOTAL	VOC Savings		TTC Savings		TOTAL
	Roads	BUSWAY	Add. Invest.		Public	Private	Public	Private	
1991	515.04	-	-	515.04	-	-	-	-	-
1992	515.04	-	-	515.04	-	-	-	-	-
1993	515.04	-	-	515.04	-	-	-	-	-
1994	515.04	-	-	515.04	-	-	-	-	-
1995	515.04	-	-	515.04	-	-	-	-	-
1996	515.04	-	-	515.04	-	137.78	-	11.98	149.76
1997	515.04	-	-	515.04	-	275.55	-	23.96	299.51
1998	515.04	-	-	515.04	-	413.33	-	35.94	449.27
1999	515.04	-	-	515.04	-	551.11	-	47.92	599.03
2000	515.04	-	-	515.04	-	688.88	-	59.90	748.78
2001	515.04	-	-	515.04	-	826.66	-	71.88	898.54
2002	515.04	-	-	515.04	-	964.44	-	83.86	1,048.30
2003	515.04	-	-	515.04	-	1,102.21	-	95.84	1,198.05
2004	515.04	-	-	515.04	-	1,239.99	-	107.82	1,347.81
2005	515.04	-	-	515.04	-	1,377.77	-	119.80	1,497.57
2006	515.04	823.80	-	1,338.84	-	1,515.54	-	131.78	1,647.32
2007	515.04	823.80	-	1,338.84	-	1,653.32	-	143.75	1,797.07
2008	515.04	823.80	-	1,338.84	-	1,791.10	-	155.73	1,946.83
2009	515.04	823.80	-	1,338.84	-	1,928.87	-	167.71	2,096.58
2010	515.04	823.80	-	1,338.84	-	2,066.65	-	179.69	2,246.34
2011	-	-	127.56	127.56	231.34	2,204.43	91.75	191.67	2,719.19
2012	-	-	127.56	127.56	238.28	2,270.56	94.50	197.42	2,800.76
2013	-	-	127.56	127.56	245.43	2,338.68	97.34	203.34	2,884.79
2014	-	-	127.56	127.56	252.79	2,408.84	100.26	209.44	2,971.33
2015	-	-	127.56	127.56	260.38	2,481.11	103.27	215.73	3,060.49
2016	-	-	127.56	127.56	268.19	2,555.54	106.36	222.20	3,152.29
2017	-	-	1,385.35	1,385.35	276.23	2,632.20	109.55	228.86	3,246.84
2018	-	-	127.56	127.56	284.52	2,711.17	112.84	235.73	3,344.26
2019	-	-	127.56	127.56	293.05	2,792.51	116.23	242.80	3,444.59
2020	-	-	317.06	317.06	301.85	2,876.28	119.71	250.09	3,547.93
2021	-	-	127.56	127.56	310.90	2,962.57	123.30	257.59	3,654.36
2022	-	-	127.56	127.56	320.23	3,051.45	127.00	265.32	3,764.00
2023	-	-	127.56	127.56	329.84	3,142.99	130.81	273.28	3,876.92
2024	-	-	1,385.35	1,385.35	339.73	3,237.28	134.74	281.47	3,993.22
2025	-	-	127.56	127.56	349.92	3,334.40	138.78	289.92	4,113.02
2026	-	-	127.56	127.56	360.42	3,434.43	142.94	298.62	4,236.41
2027	-	-	127.56	127.56	371.23	3,537.46	147.23	307.57	4,363.49
2028	-	-	127.56	127.56	382.37	3,643.59	151.65	316.80	4,494.41
2029	-	-	127.56	127.56	393.84	3,752.89	156.20	326.31	4,629.24
2030	-	-	317.06	317.06	405.66	3,865.48	160.88	336.09	4,768.11
2031	-	-	1,385.35	1,385.35	417.83	3,981.45	165.71	346.18	4,911.17
2032	-	-	127.56	127.56	430.36	4,100.89	170.68	356.56	5,058.49
2033	-	-	127.56	127.56	443.27	4,223.92	175.80	367.26	5,210.25
2034	-	-	127.56	127.56	456.57	4,350.63	181.08	378.28	5,366.56
2035	-	-	127.56	127.56	470.27	4,481.15	186.51	389.63	5,527.56
2036	-	-	127.56	127.56	484.37	4,615.59	192.10	401.31	5,693.37
2037	-	-	127.56	127.56	498.91	4,754.05	197.87	413.35	5,864.18
2038	-	-	1,385.35	1,385.35	513.87	4,896.68	203.80	425.75	6,040.10
2039	-	-	127.56	127.56	529.29	5,043.58	209.92	438.53	6,221.32
2040	-	-	317.06	317.06	545.17	5,194.88	216.21	451.68	6,407.94
B/C Ratio				1.3607					
NET PRESENT VALUE (NPV)				1,656.55 million Rupees					
ECONOMIC INTERNAL RATE OF RETURN (EIRR)				15.273 %					

Appendices for Chapter 10

Appendix 10-1 Proposed Project List (1)

Improvement of Existing Roads

Code	Name of Road	Location	Length (km)	Short-term (1992-1995)	Medium-term (1996-2000)	Long-term (2001-2010)
RI-01	Bund Rd.	Shalimar Rd. - New Bridge(2→4)	1.15	○		
RI-02	Bund Rd.	New Bridge - Purana Sanda Rd. (2→4)	3.75	○		
RI-03	Bund Rd.	Darban Data - Ravi Rd. (2→4)	3.50	○		
RI-04	Bund Rd.	Ravi Rd. - Mahmud Bat(2→4)	9.00	○		
RI-05	G.T. Rd.	Bund Rd. - Badami Bagh(2→4)	1.35	○		
RI-06	G.T. Rd.	Badami Bagh - Lahore Station(2→4)	1.20	○		
RI-07	G.T. Rd.	Delhi Gate - Lahore Station(2→4)	2.10	○		
RI-08	C1	Bund Rd. - G.T. Rd. (2→4)	0.90		○	
RI-09	Shalimar Rd.	G.T. Rd. - Allama Iqbal Rd. (2→4)	1.05		○	
RI-10	Egerton Rd.	Durand Rd. - Koper Rd. (2→4)	0.60		○	
RI-11	Bahawalpur Rd.	Muzang Chungi - Multan Rd. (2→4)	1.20		○	
RI-12	Bhawaja Farid Rd.	Multan Rd. - Bund Rd. (2→4)	2.90		○	
RI-13	Shalimar Link Rd.	C2 - Canal Bank Rd. (2→4)	0.75		○	
RI-14	Jail Rd.	Sarwar Rd. - Main Gulberg(2→4)	1.60		○	
RI-15	Maulana Fazal Hag Rd.	Wahdat Rd. - Multan Rd. (2→4)	1.60		○	
RI-16	Main Rd. in Green Town	R7 - Industrial Area in Township(2→4)	2.00	○		
RI-17	Sharaqpur Rd.	Sharaqpur Rd. - G.T. Rd. (2→4)	7.40		○	
RI-18	Sharaqpur Rd.	Sharaqpur Bypass - LMA Border(2→4)	17.50			○
RI-19	Abdali Rd.	Lower Mall - Purana Sanda Rd. (2→4)	1.40	○		
RI-20	S.M.A. Hai Rd.	Ganda Nala - WAPDA Town(2→4)	4.30			○
Total			65.25	25.45	18.00	21.80

New Construction of Roads

Code	Name of Road	Location	Length (km)	Short-term (1992-1995)	Medium-term (1996-2000)	Long-term (2001-2010)
RC-01	Ravi Rd.	Shahdara - Bund Rd. (4)	2.00	○		
RC-02	G.T. Rd. (Bypass)	Flyover - Lahore Station(4)	2.10	○		
RC-03	Bund Rd. Link Rd. -1	Bund Rd. - Sultanpura Rd. (4)	2.80	○		
RC-04	Misri Shah Link Rd.	G.T. Rd. - Misri Shah Rd. (2)	1.80	○		
RC-05	Bund Rd. Link Rd. -2	Bund Rd. - Purana Sanda Rd. (4)	1.00	○		
RC-06	Multan Rd. Bypass	The Mall - Multan Rd. (4)	2.00			○
RC-07	G.T. Rd. Link Rd.	G.T. Rd. - Ghazi Rd. (2)	5.05		○	
RC-08	G.T. Rd. Link Rd.	G.T. Rd. - C4(2)	2.00			○
RC-09	Canal Bank Link Rd.	Canal Bank Rd. - Ghazi Rd. (2)	3.40			○
RC-10	Ghazi Link Rd.	Ghazi Rd. - C4(4)	2.00		○	
RC-11	Ferozepur Link Rd.	Ferozepur Rd. - Peco Rd. (2)	1.50		○	
RC-12	C2	Multan Rd. - Maulana Fazal Haq Rd. (4)	1.60	○		
RC-13	C2	Wahdat Rd. - Allama Iqbal Rd. (4)	0.40	○		
RC-14	C2	Bund Rd. - Sharaqpur Rd. (4)	7.50		○	
RC-15	Multan Link Rd.	Multan Rd. - C5(4)	2.10		○	
RC-16	C4	Bund Rd. - Ferozepur Rd. (4)	27.85		○	
RC-17	C4	Ferozepur Rd. - C5(4)	13.20	○		
RC-18	C4	C5 - Sharaqpur Rd. (4)	8.00			○
RC-19	Sharaqpur Rd. Bypass	Sharaqpur Rd. - G.T. Rd. (4)	9.00		○	
RC-20	C5	Multan Rd. - Ferozepur Rd. (4)	15.70		○	
RC-21	C5(Multan Rd. Bypass)	Multan Rd. - Bund Rd. (4)	9.50	○		
RC-22	C6	Multan Rd. - Ferozepur Rd. (4)	19.60			○
RC-23	C7	Multan Rd. - Ferozepur Rd. (4)	22.30			○
RC-24	R6	C4 - C7(4)	10.20			○
RC-25	R7	C4 - C7(6)	9.20			○
RC-26	R8	Maulana Shaukai Ali Rd. - C7(4)	13.00			○
RC-27	New Campus Rd.	Canal Bank Rd. - Wahdat Rd. (4)	1.90		○	
RC-28	Ganda Nala Rd.	Peco Rd. - Ferozepur Rd. (6)	2.70			○
Total			199.4	34.40	72.60	92.40

Appendix 10-2 Proposed Project List (2)

New Construction of Bridges and Flyovers

Code	Name of Road	Location	Length (m)	Short-term (1992-1995)	Medium-term (1996-2000)	Long-term (2001-2010)
BR-01	G.T. Rd.	Between two existing bridges(4)	500	○		
BR-02	C2	C2 on the Ravi River(4)	540		○	
BR-03	C4	C4 on the Ravi River(4)	810			○
FO-01	G.T. Rd.	G.T. Rd. × Sheikhpura Rd. (4)	300		○	
FO-02	Bund Rd.	Bund Rd. × G.T. Rd. & R/W Line(4)	700	○		
FO-03	Ravi Rd.	Ravi Rd. × Bund Rd. (4)	300	○		
FO-04	G.T. Rd.	G.T. Rd. × C2(4)	300		○	
FO-05	Shalamar Rd.	Shalamar Rd. × R/W Line(4)	400		○	
FO-06	Shalimar Link Rd.	Shalimar Link Rd. × Canal & R/W Line(4)	600	○		
FO-07	The Mall	The Mall × Canal Bank Rd. (4)	300		○	
FO-08	Jail Rd.	Jail Rd. × Canal Bank Rd. (4)	300		○	
FO-09	Qartaba Chowk	Ferozpur Rd. × Lytton Rd. (4)	300	○		
FO-10	Ferozpur Rd.	Ferozpur Rd. × Canal & Wahdat Rd. (4)	750	○		
FO-11	Kalma Chowk	Ferozpur × Main Gulberg(6)	600	○		
FO-12	Ferozpur Rd.	Ferozpur Rd. × Ghazi Rd. (4)	300		○	
FO-13	Ferozpur Rd.	Ferozpur × C4(4)	300		○	
FO-14	Park Rd.	Park Rd. × R/W Line(4)	400	○		
FO-15	Peco Rd.	Peco Rd. × R/W Line(4)	400		○	
FO-16	C4	C4 × R/W Line(4)	400	○		
FO-17	C5	C5 × R/W Line(4)	400		○	
FO-18	C6	C6 × R/W Line(4)	400			○
FO-19	C7	C7 × R/W Line(4)	400			○
FO-20	Wahdat Rd.	Wahdat Rd. × Allama Iqbal Rd. (4)	300		○	
FO-21	Yatim Khana Chowk	Multan Rd. × Bund Rd. (4)	300		○	
FO-22	Multan Rd.	Multan Rd. × C4(4)	300	○		
FO-23	Bund Rd.	Bund Rd. × C5(4)	300		○	
FO-24	C5	C5 × C4(4)	300			○
FO-25	Multan Rd.	Multan Rd. × C5(4)	300		○	
FO-26	Sharaqpur Link Rd.	Sharaqpur Link Rd. × Sheikhpura Rd. (4)	300		○	
Total				1B/R*9F/0	1B/R*14F/0	1B/R*3F/0

Bus Priority Lanes

Code	Location	Length (km)	Short-term (1992-1995)	Medium-term (1996-2000)	Long-term (2001-2010)
BP-01	Lahore City Station - Badami Bagh - G.T. Rd. - Shahdara(4→6)	11.90		○	
BP-02	Badami Bagh - Lower Mall - Multan Rd. - Niaz Beg(4)	12.30		○	
BP-03	Aiwan Iqbal Complex - Shalimar Rd. - G.T. Rd. - crossing with Bund Rd. (4→6)	8.80		○	
BP-04	Lahore City Station - Allama Iqbal Rd. - Ghazi Rd. - Sadar Bazar(2→4)	5.70		○	
BP-05	Model Town South - Ganda Mata Rd. - S.M.A. Hai Rd. - crossing with C6(6)	13.20			○
Total		51.90		38.70	12.50

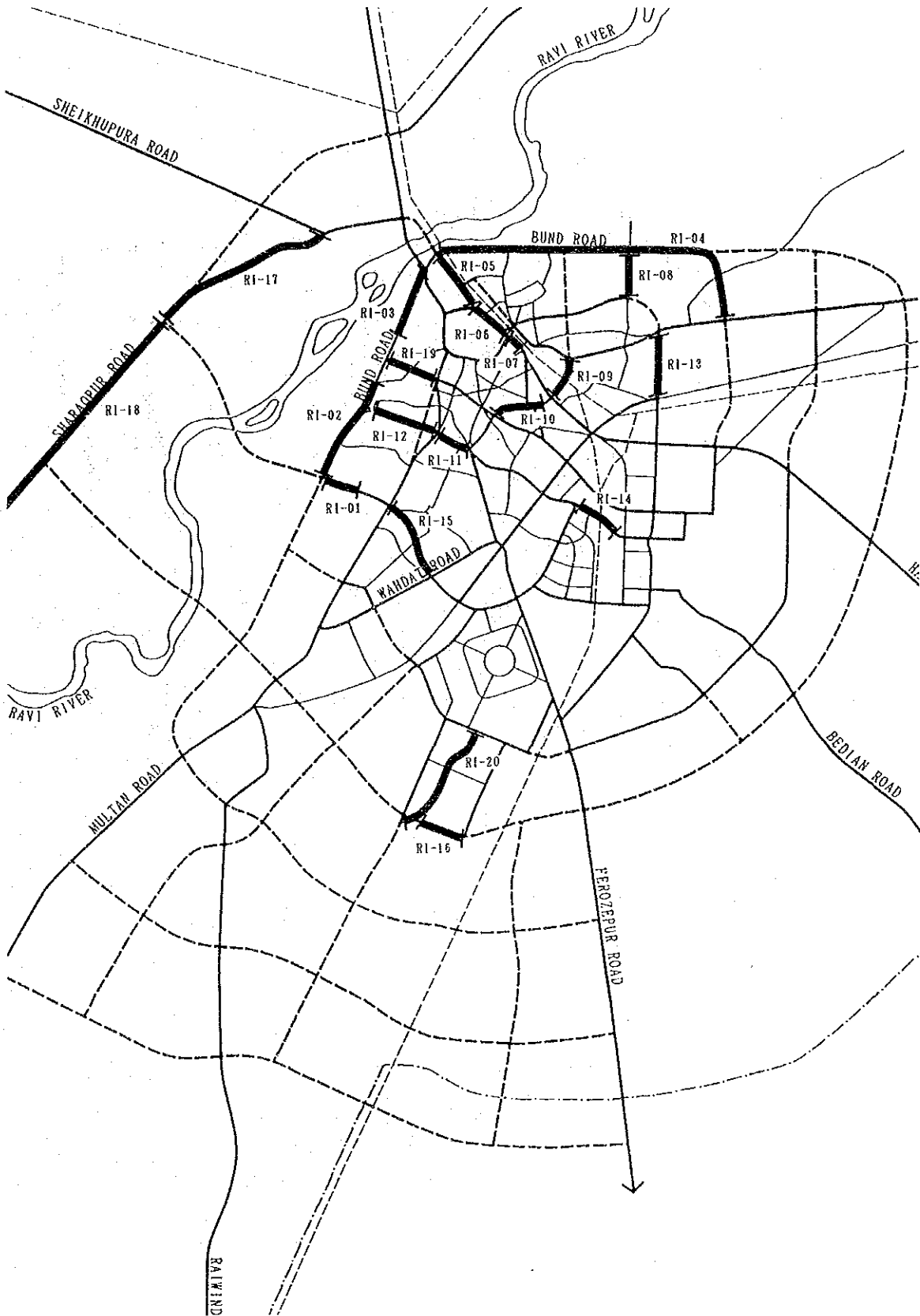
Rail Transit System

Code	System/Facility	Location	Length (km)	Short-term (1992-1995)	Medium-term (1996-2000)	Long-term (2001-2010)
LR-01	LRT	Data Darbar - Model Town South(18 sta.)	12.50			○
HR-01	HRT Improvement	Lahore St. - Raiwind(11 stations)	40.00		○	
Total			52.50		40.00	12.50

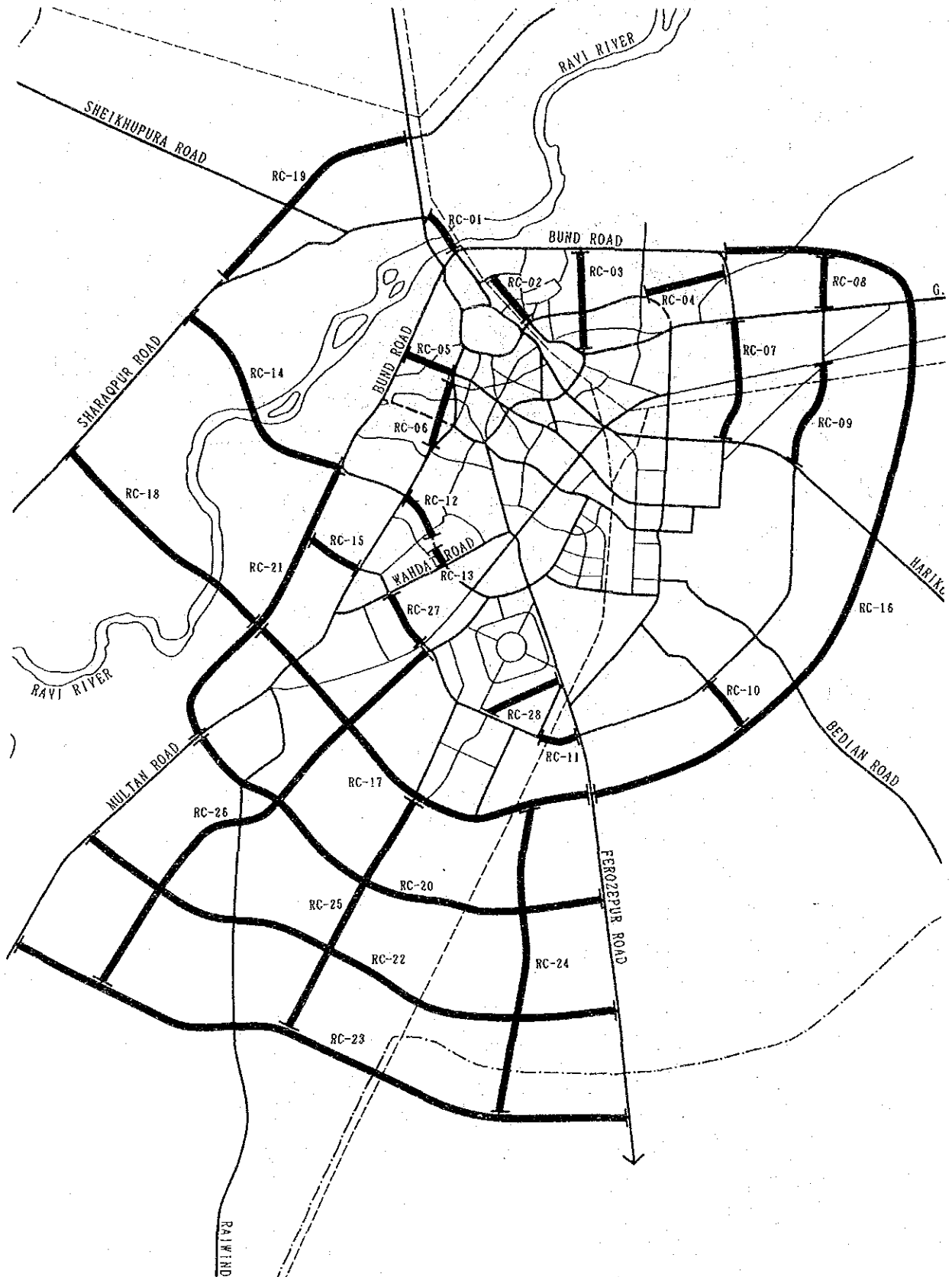
Mode Interchange Area

Code	Location	Area (ha)	Short-term (1992-1995)	Medium-term (1996-2000)	Long-term (2001-2010)
LS-01	Data Darbar	1.80			○
LS-02	Model Town South	3.70			○
Total		5.50			5.50

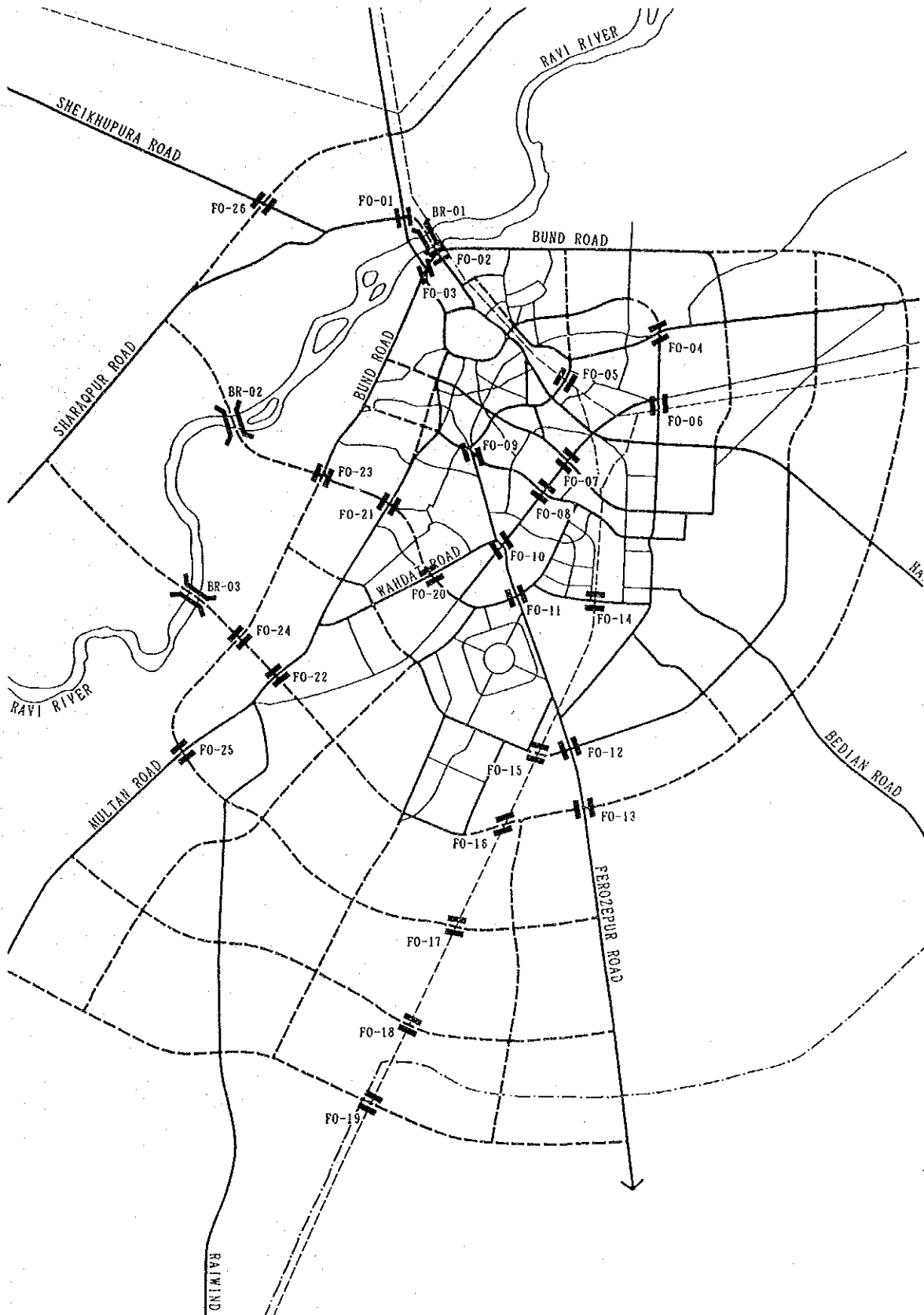
Appendix 10-3 Location of Proposed Project
(Improvement of Existing Roads)



Appendix 10-4 Location of Proposed Project
(New Construction of Roads)



Appendix 10-5 Location of Proposed Project
 (New Construction of Bridges and Flyovers)



Appendices for Chapter 11

Table 11.4.1 Cost/Benefit Flow of Flyovers: Qartaba Chowk

(unit: million Rps)
1990 price

Year	Cost		Benefit	
	Initial Investment	O/M Cost	Total (VOC Savings)	
1991	20.070	--	20.070	--
1992	60.209	--	60.209	--
1 1993	--	0.036	0.036	21.008
2 1994	--	0.036	0.036	21.638
3 1995	--	0.036	0.036	22.287
4 1996	--	0.036	0.036	22.956
5 1997	--	0.036	0.036	23.645
6 1998	--	0.036	0.036	24.354
7 1999	--	0.036	0.036	25.085
8 2000	--	0.036	0.036	25.837
9 2001	--	0.036	0.036	26.612
10 2002	--	0.036	0.036	27.411
11 2003	--	0.036	0.036	28.233
12 2004	--	0.036	0.036	29.080
13 2005	--	0.036	0.036	29.952
14 2006	--	0.036	0.036	30.851
15 2007	--	0.036	0.036	31.776
16 2008	--	0.036	0.036	32.730
17 2009	--	0.036	0.036	33.712
18 2010	--	0.036	0.036	34.723
19 2011	--	0.036	0.036	34.723
20 2012	--	0.036	0.036	34.723
21 2013	--	0.036	0.036	34.723
22 2014	--	0.036	0.036	34.723
23 2015	--	0.036	0.036	34.723
24 2016	--	0.036	0.036	34.723
25 2017	--	0.036	0.036	34.723
26 2018	--	0.036	0.036	34.723
27 2019	--	0.036	0.036	34.723
28 2020	--	0.036	0.036	34.723
29 2021	--	0.036	0.036	34.723
30 2022	--	0.036	0.036	34.723

B/C Ratio : 2.527 (Cost 66.149, Benefit 167.184)
 NPV : 101.035 million Rps
 EIRR : 27.358%

Initial investment (construction) cost appropriated 25% to 1991 and 75% to 1992.

VOC savings include annual 3.0% growth of traffic volume up to 2010

Table 11.4.2 Cost/Benefit Flow of Flyovers: Ferozepur/Canal

(unit: million Rps)
1990 price

Year	Cost		Benefit	
	Initial Investment	O/M Cost	Total (VOC Savings)	
1991	21.628	--	21.628	--
1992	64.885	--	64.885	--
1 1993	--	0.037	0.037	45.026
2 1994	--	0.037	0.037	46.377
3 1995	--	0.037	0.037	47.768
4 1996	--	0.037	0.037	49.201
5 1997	--	0.037	0.037	50.677
6 1998	--	0.037	0.037	52.197
7 1999	--	0.037	0.037	53.763
8 2000	--	0.037	0.037	55.376
9 2001	--	0.037	0.037	57.038
10 2002	--	0.037	0.037	58.749
11 2003	--	0.037	0.037	60.511
12 2004	--	0.037	0.037	62.327
13 2005	--	0.037	0.037	64.196
14 2006	--	0.037	0.037	66.122
15 2007	--	0.037	0.037	68.106
16 2008	--	0.037	0.037	70.149
17 2009	--	0.037	0.037	72.254
18 2010	--	0.037	0.037	74.421
19 2011	--	0.037	0.037	74.421
20 2012	--	0.037	0.037	74.421
21 2013	--	0.037	0.037	74.421
22 2014	--	0.037	0.037	74.421
23 2015	--	0.037	0.037	74.421
24 2016	--	0.037	0.037	74.421
25 2017	--	0.037	0.037	74.421
26 2018	--	0.037	0.037	74.421
27 2019	--	0.037	0.037	74.421
28 2020	--	0.037	0.037	74.421
29 2021	--	0.037	0.037	74.421
30 2022	--	0.037	0.037	74.421

B/C Ratio : 5.027 (Cost 71.274, Benefit 388.321)
 NPV : 287.047 million Rps
 EIRR : 49.29%

Initial investment (construction) cost appropriated 25% to 1991 and 75% to 1992.

VOC savings include annual 3.0% growth of traffic volume up to 2010

Table 11.4.3 Cost/Benefit Flow of Flyovers: Kalma Chowk

(unit: million Rps)
1990 price

Year	Cost		Benefit	
	Initial Investment	O/M Cost	Total (VOC Savings)	
1991	16.200	--	16.200	--
1992	48.600	--	48.600	--
1 1993	--	0.030	0.030	13.773
2 1994	--	0.030	0.030	14.186
3 1995	--	0.030	0.030	14.612
4 1996	--	0.030	0.030	15.050
5 1997	--	0.030	0.030	15.502
6 1998	--	0.030	0.030	15.967
7 1999	--	0.030	0.030	16.446
8 2000	--	0.030	0.030	16.939
9 2001	--	0.030	0.030	17.447
10 2002	--	0.030	0.030	17.971
11 2003	--	0.030	0.030	18.510
12 2004	--	0.030	0.030	19.065
13 2005	--	0.030	0.030	19.637
14 2006	--	0.030	0.030	20.226
15 2007	--	0.030	0.030	20.833
16 2008	--	0.030	0.030	21.458
17 2009	--	0.030	0.030	22.102
18 2010	--	0.030	0.030	22.765
19 2011	--	0.030	0.030	22.765
20 2012	--	0.030	0.030	22.765
21 2013	--	0.030	0.030	22.765
22 2014	--	0.030	0.030	22.765
23 2015	--	0.030	0.030	22.765
24 2016	--	0.030	0.030	22.765
25 2017	--	0.030	0.030	22.765
26 2018	--	0.030	0.030	22.765
27 2019	--	0.030	0.030	22.765
28 2020	--	0.030	0.030	22.765
29 2021	--	0.030	0.030	22.765
30 2022	--	0.030	0.030	22.765

B/C Ratio : 2.053 (Cost 53.400, Benefit 109.608)
 NPV : 56.208 million Rps
 EIRR : 22.876%

Initial investment (construction) cost appropriated 25% to 1991 and 75% to 1992.

VOC savings include annual 3.0% growth of traffic volume up to 2010

Appendix Table 12.9.1 Comparison of Volume, Average Velocity and VOC of Public Transport

		PCU [Vehicle.1000km] (1000km)	Average Speed (km/h)	VOC at the speed (Rs./1000km)
WITHOUT LRT	INNER	2,383.5 [916.73]	17.89	3,279.27
	OUTER	2,560.3 [984.73]	41.12	1,928.34
WITH	INNER	1,515.3 [582.81]	21.75	2,857.80
	OUTER	2,161.3 [831.27]	43.30	1,877.15

Note : VOC at the Speed is calculated based on "Improved Road Condition" of Table 9-3-5.

Appendix Table 12.9.2 VOC Savings of Public Transport

	VOC (Rs.1,000/day)	(Rs.million/year)
WITHOUT LRT	4,905.10	1,790.36
WITH LRT	3,225.97	1,177.48
Difference	1,679.13	612.88

Appendix Table 12.9.3 TTC Savings of Public Transport

CASE	AREA	TTC Savings
WITHOUT LRT	INNER	327.3 (1000 PCU.hrs)
	OUTER	121.8 (1000 PCU.hrs)
	Total	449.1 (1000 PCU.hrs)
WITHOUT LRT	INNER	190.8 (1000 PCU.hrs)
	OUTER	102.3 (1000 PCU.hrs)
	Total	293.1 (1000 PCU.hrs)
Total	Time Savings : 156.0 thousand PCU hours divided by 2.6 : 60.0 thousand Vehicle hours of which mini-bus 47.31 thousand V.hours, Bus 12.69 " " "	
TTC	per Vehicle (See Appendix Table 9-3-2)	
	Mini-Bus	70 Rs./hour
	Bus	184 Rs./hour
Total	TTC Savings	(thousand /day) (million/year)
	Bus	Rs.3,311.70 Rs.1,208.77
	Mini-Bus	Rs.2,334.96 Rs. 852.26
	Total	Rs.5,646.66 Rs.2,061.03

30% of "Total TTC Savings" is assumed to be attributed from the introduction of LRT.

TTC Savings of LRT : 618.31 million Rs./year
(at the first year of introduction)

Appendix Table 12.9.4 Economic Cost/Benefit Flow of LRT Project

(Unit: million Rps)
in 1990 price

		Cost			Benefit			
		Initial Investment (Construction)	Additional Investment (Rolling Stock)	Annual O/M Cost	Total	VOC Savings	TTC Savings	Total
1	2005	907.72	--	--	907.72	--	--	--
2	2006	907.72	--	--	907.72	--	--	--
3	2007	907.72	--	--	907.72	--	--	--
4	2008	907.72	--	--	907.72	--	--	--
5	2009	907.72	--	--	907.72	--	--	--
6	2010	--	--	160.30	160.30	612.88	618.31	1,231.19
7	2011	--	--	160.30	160.30	631.27	636.86	1,268.13
8	2012	--	--	160.30	160.30	650.20	655.97	1,306.17
9	2013	--	--	160.30	160.30	669.71	675.64	1,345.35
10	2014	--	--	160.30	160.30	689.80	695.91	1,385.71
11	2015	--	--	160.30	160.30	710.50	716.76	1,427.26
12	2016	--	--	160.30	160.30	731.81	738.29	1,470.10
13	2017	--	--	160.30	160.30	753.77	760.44	1,514.21
14	2018	--	--	160.30	160.30	776.38	783.26	1,559.64
15	2019	--	--	160.30	160.30	799.67	806.75	1,606.42
16	2020	--	--	160.30	160.30	823.66	830.96	1,654.62
17	2021	--	--	160.30	160.30	848.37	855.89	1,704.26
18	2022	--	--	160.30	160.30	873.82	881.56	1,755.38
19	2023	--	--	160.30	160.30	900.03	908.01	1,808.04
20	2024	--	--	160.30	160.30	927.04	935.25	1,862.29
21	2025	--	241.00	160.30	401.30	954.85	963.31	1,918.16
22	2026	--	--	160.30	160.30	983.49	992.21	1,975.70
23	2027	--	--	160.30	160.30	1,013.00	1,021.97	2,034.97
24	2028	--	--	160.30	160.30	1,043.39	1,052.63	2,096.02
25	2029	--	--	160.30	160.30	1,074.69	1,084.21	2,158.90
26	2030	--	--	160.30	160.30	1,106.93	1,116.74	2,223.67
27	2031	--	--	160.30	160.30	1,140.14	1,150.24	2,290.38
28	2032	--	--	160.30	160.30	1,174.34	1,184.75	2,359.09
29	2033	--	--	160.30	160.30	1,209.57	1,220.29	2,429.86
30	2034	--	--	160.30	160.30	1,245.86	1,256.90	2,502.76
31	2035	--	--	160.30	160.30	1,283.23	1,294.60	2,577.83
32	2036	--	--	160.30	160.30	1,321.73	1,333.44	2,655.17
33	2037	--	--	160.30	160.30	1,361.38	1,373.45	2,734.83
34	2038	--	--	160.30	160.30	1,402.23	1,414.65	2,816.88
35	2039	--	--	160.30	160.30	1,444.29	1,457.09	2,901.38
B/C Ratio	:	1.77 (Cost : 4,027.15 million Rps Benefit: 7,133.45 million Rps)						
Net Present Value	:	3,106.30 million Rps						
EIRR	:	19.23% (19.226%)						

Appendix Table 12.9.5 Financial Cost Flow of LRT Project

(Unit: million Rps)
in 1990 price

		Expenditure				Revenue
		Construction Cost	Additional Investment	Annual O/M Cost	Total	
1	2005	1,192.96	--	--	1,192.96	--
2	2006	1,192.96	--	--	1,192.96	--
3	2007	1,192.96	--	--	1,192.96	--
4	2008	1,192.96	--	--	1,192.96	--
5	2009	1,192.96	--	--	1,192.96	--
6	2010	--	--	210.70	210.70	346.50
7	2011	--	--	210.70	210.70	356.90
8	2012	--	--	210.70	210.70	367.60
9	2013	--	--	210.70	210.70	378.63
10	2014	--	--	210.70	210.70	389.99
11	2015	--	--	210.70	210.70	401.69
12	2016	--	--	210.70	210.70	413.74
13	2017	--	--	210.70	210.70	426.15
14	2018	--	--	210.70	210.70	438.94
15	2019	--	--	210.70	210.70	452.10
16	2020	--	--	210.70	210.70	465.67
17	2021	--	--	210.70	210.70	479.64
18	2022	--	--	210.70	210.70	494.03
19	2023	--	--	210.70	210.70	508.85
20	2024	--	--	210.70	210.70	524.11
21	2025	--	316.80	210.70	527.50	539.84
22	2026	--	--	210.70	210.70	556.03
23	2027	--	--	210.70	210.70	572.71
24	2028	--	--	210.70	210.70	589.89
25	2029	--	--	210.70	210.70	607.59
26	2030	--	--	210.70	210.70	625.82
27	2031	--	--	210.70	210.70	644.59
28	2032	--	--	210.70	210.70	663.93
29	2033	--	--	210.70	210.70	683.85
30	2034	--	--	210.70	210.70	704.36
31	2035	--	--	210.70	210.70	725.49
32	2036	--	--	210.70	210.70	747.26
33	2037	--	--	210.70	210.70	769.68
34	2038	--	--	210.70	210.70	792.77
35	2039	--	--	210.70	210.70	816.55
Financial Internal Rate of Return :					2.50%	

Appendices for Chapter 13

Appendix Table 13.4.1 Public service Buses Increase of Mini Buses
Demand Forecast and Increase of Vehicles

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Demand for public service (person trips '000)	1.00000	1.03904	1.07960	1.12175	1.16555	1.21105	1.25833	1.30745	1.35850	1.41153
1) Mini Bus										
a. On roads	2058									
b. To be depleted 1/8		257.3	257.3	257.3	257.3	257.3	257.3	257.3	259.0	257.3
c. For replacement of b		257	257	257	257	257	257	257	259	257
d. Addition caused by Demand		80	80	80	80	80	80	80	80	80
e. For replacement of d										80
f. Total		337	337	337	337	337	337	337	339	417
g. Fin. cost (@230,000) In Rs'000		77510	77510	77510	77510	77510	77510	77510	77970	95910

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
1.46664	1.52389	1.58339	1.64520	1.70943	1.77617	1.84551	1.91756	1.99242	2.07020	2.15102	
											0
257.3	257.3	257.3	257.3	257.3	257.3	259.0	257.3	257.3	257.3	257.3	5149
257	257	257	257	257	257	259	257	257	257	257	5144
80	80	80	80	80	80	80	80	80	80	80	1600
80	80	80	80	80	80	80	80	80	80	80	960
417	417	417	417	417	417	419	417	417	417	417	7704
95910	95910	95910	95910	95910	95910	96370	95910	95910	95910	95910	1771920

Appendix Table 13.4.2 Public service Buses Mazda Bus
Demand Forecast and Increase of Vehicles

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Demand for public service (person trips '000)	1.00000	1.03904	1.07960	1.12175	1.16555	1.21105	1.25833	1.30745	1.35850	1.41153
2) Mazda Bus										
a. On roads	131									
b. To be depleted 1/8		16.4	16.4	16.4	16.4	16.4	16.4	16.4	19.0	16.4
c. For replacement of b		16	16	16	16	16	16	16	19	16
d. Addition caused by Demand		5	5	5	5	5	5	5	5	5
e. For replacement of d										5
f. Total		21	21	21	21	21	21	21	24	26
g. Fin. cost (@330,000) In Rs'000		6930	6930	6930	6930	6930	6930	6930	7920	8580

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
1.46664	1.52389	1.58339	1.64520	1.70943	1.77617	1.84551	1.91756	1.99242	2.07020	2.15102	
											0
16.4	16.4	16.4	16.4	16.4	16.4	19.0	16.4	16.4	16.4	16.4	333
16	16	16	16	16	16	19	16	16	16	16	326
5	5	5	5	5	5	5	5	5	5	5	100
5	5	5	5	5	5	5	5	5	5	5	60
26	26	26	26	26	26	29	26	26	26	26	486
8580	8580	8580	8580	8580	8580	9570	8580	8580	8580	8580	160380

Appendix Table 13.4.3 Public service Buses Private Bus
Demand Forecast and Increase of Vehicles

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Demand for public service (person trips '000)	1.00000	1.03904	1.07960	1.12175	1.16555	1.21105	1.25833	1.30745	1.35850	1.41153
3) Private Bus										
a. On roads	260									
b. To be depleted 1/8		32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5
c. For replacement of b		33	33	33	33	33	33	33	33	33
d. Addition caused by Demand		10	10	10	10	10	10	10	10	10
e. For replacement of d										10
f. Total		43	43	43	43	43	43	43	43	53
g. Fin. cost (@460,000) In Rs'000		19780	19780	19780	19780	19780	19780	19780	19780	24380

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
1.46664	1.52389	1.58339	1.64520	1.70943	1.77617	1.84551	1.91756	1.99242	2.07020	2.15102	
											0
32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5	650
33	33	33	33	33	33	33	33	33	33	33	660
10	10	10	10	10	10	10	10	10	10	10	200
10	10	10	10	10	10	10	10	10	10	10	120
53	53	53	53	53	53	53	53	53	53	53	980
24380	24380	24380	24380	24380	24380	24380	24380	24380	24380	24380	450800

Appendix Table 13.4.4 Public service Buses Suzuki Wagon
Demand Forecast and Increase of Vehicles

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Demand for public service (person trips '000)	1.00000	1.03904	1.07960	1.12175	1.16555	1.21105	1.25833	1.30745	1.35850	1.41153
4) Suzuki Wagon										
a. On roads	213									
b. To be depleted 1/8		26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6
c. For replacement of b		27	27	27	27	27	27	27	24	27
d. Addition caused by Demand		8	8	8	8	8	8	8	8	8
e. For replacement of d										8
f. Total		35	35	35	35	35	35	35	32	43
g. Fin. cost (@70,000) In Rs'000		2450	2450	2450	2450	2450	2450	2450	2240	3010

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
1.46664	1.52389	1.58339	1.64520	1.70943	1.77617	1.84551	1.91756	1.99242	2.07020	2.15102	
											0
26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	532
27	27	27	27	27	27	27	27	27	27	27	537
8	8	8	8	8	8	8	8	8	8	8	160
8	8	8	8	8	8	8	8	8	8	8	96
43	43	43	43	43	43	43	43	43	43	43	793
3010	3010	3010	3010	3010	3010	3010	3010	3010	3010	3010	55510

Appendix Table 13.4.5 Public service Buses PRTC Bus
Demand Forecast and Increase of Vehicles

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999		
Demand for public service (person trips '000)	1.00000	1.03904	1.07960	1.12175	1.16555	1.21105	1.25833	1.30745	1.35850	1.41153		
5) PRTC Bus												
a. On roads	85											
b. To be depleted 1/8		11	11	11	11	11	11	11	8			
c. For replacement of b		11	11	11	11	11	11	11	8	11		
d. Addition caused by Demand		3	3	3	3	3	3	3	3	3		
e. For replacement of d										3		
f. Total		14	14	14	14	14	14	14	11	17		
g. Fin. cost (2460,000) in Rs'000		6440	6440	6440	6440	6440	6440	6440	5060	7820		

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
	1.46664	1.52389	1.58339	1.64520	1.70943	1.77617	1.84551	1.91756	1.99242	2.07020	2.15102	
												0
												85
	11	11	11	11	11	11	8	11	11	11	11	214
	3	3	3	3	3	3	3	3	3	3	3	60
	3	3	3	3	3	3	3	3	3	3	3	36
	17	17	17	17	17	17	14	17	17	17	17	310
	7820	7820	7820	7820	7820	7820	6440	7820	7820	7820	7820	142600

Appendix Table 13.4.6 Public Service Buses.... Total Vehicle Purchase Cost.

(In Rs'000)

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Demand for public service (person trips '000)	1.00000	1.03904	1.07960	1.12175	1.16555	1.21105	1.25833	1.30745	1.35850	1.41153
1) Mini Bus		77510	77510	77510	77510	77510	77510	77510	77970	95910
2) Mazda Bus		6930	6930	6930	6930	6930	6930	6930	7920	8580
3) Private Bus		19780	19780	19780	19780	19780	19780	19780	19780	24380
4) Suzuki Wagon		2450	2450	2450	2450	2450	2450	2450	2240	3010
5) PRTC Bus		6440	6440	6440	6440	6440	6440	6440	5060	7820
Total		113110	113110	113110	113110	113110	113110	113110	112970	139700
Total in stages				565550					618590	

(In Rs'000)

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
1.46664	1.52389	1.58339	1.64520	1.70943	1.77617	1.84551	1.91756	1.99242	2.07020	2.15102	
95910	95910	95910	95910	95910	95910	96370	95910	95910	95910	95910	1771920
8580	8580	8580	8580	8580	8580	9570	8580	8580	8580	8580	160380
24380	24380	24380	24380	24380	24380	24380	24380	24380	24380	24380	450800
3010	3010	3010	3010	3010	3010	3010	3010	3010	3010	3010	55510
7820	7820	7820	7820	7820	7820	6440	7820	7820	7820	7820	142600
139700	139700	139700	139700	139700	139700	139770	139700	139700	139700	139700	2581210
						1397070					2581210

Appendix Table 13.4.7 Public Service Buses.... Mini Bus
Replacing part of mini buses by medium buses

(Rs'000)

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Demand for public service (person trips '000)	1.00000	1.03904	1.07960	1.12175	1.16555	1.21105	1.25833	1.30745	1.35850	1.41153
1) Mini Bus										
a. On roads	2058									
b. To be depleted 1/8		257.3	257.3	257.3	257.3	257.3	257.3	257.3	259.0	257.3
c. For replacement of b		257	257	257	257	257	257	257	259	257
d. Addition caused by Demand		80	80	80	80	80	80	80	80	80
e. For replacement of d										80
f. Total		337	337	337	337	337	337	337	339	417
g. Fin. cost (@230,000) In Rs'000		77510	77510	77510	77510	77510	77510	77510	77970	95910
1') Use of Medium buses: 1/3 during 1996-00 and 2/3 afterwards										
Medium							52	52	53	65
Mini							225	225	226	278
g. Fin. cost (@330,000) Med.							17160	17160	17490	21450
Fin.cost (@230,000) Mini.		77510	77510	77510	77510	77510	51750	51750	51980	63940
Total in Rs'000		77510	77510	77510	77510	77510	68910	68910	69470	85390
Total in Stages				387550					378070	

(Rs'000)

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
1.46664	1.52389	1.58339	1.64520	1.70943	1.77617	1.84551	1.91756	1.99242	2.07020	2.15102	
257.3	257.3	257.3	257.3	257.3	257.3	259.0	257.3	257.3	257.3	257.3	5149
257	257	257	257	257	257	259	257	257	257	257	5144
80	80	80	80	80	80	80	80	80	80	80	1600
80	80	80	80	80	80	80	80	80	80	80	960
417	417	417	417	417	417	419	417	417	417	417	7704
95910	95910	95910	95910	95910	95910	96370	95910	95910	95910	95910	1771920
65	130	130	130	130	130	130	130	130	130	130	1587
278	139	139	139	139	139	140	139	139	139	139	2623
21450	42900	42900	42900	42900	42900	42900	42900	42900	42900	42900	523710
63940	31970	31970	31970	31970	31970	32200	31970	31970	31970	31970	990840
85390	74870	74870	74870	74870	74870	75100	74870	74870	74870	74870	1514550
				748930							1514550
											Rs(1771920-1514550=257370)

Appendix Table 13.4.8 Public Service Buses.... Total Vehicle Purchase Cost
Including use of medium buses (In Rs/000)

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Demand for public service (person trips '000)	1.00000	1.03904	1.07960	1.12175	1.16555	1.21105	1.25833	1.30745	1.35850	1.41153
1) Mini Bus		77510	77510	77510	77510	77510	68910	68910	69470	85390
2) Mazda Bus		6930	6930	6930	6930	6930	6930	6930	7920	8580
3) Private Bus		19780	19780	19780	19780	19780	19780	19780	19780	24380
4) Suzuki Wagon		2450	2450	2450	2450	2450	2450	2450	2240	3010
5) PRTC Bus		6440	6440	6440	6440	6440	6440	6440	5060	7820
Total		113110	113110	113110	113110	113110	104510	104510	104470	129180
Total in stages				565550					571850	

(In Rs/000)											
2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
1.46664	1.52389	1.58339	1.64520	1.70943	1.77617	1.84551	1.91756	1.99242	2.07020	2.15102	
85390	74870	74870	74870	74870	74870	75100	74870	74870	74870	74870	1514550
8580	8580	8580	8580	8580	8580	9570	8580	8580	8580	8580	160380
24380	24380	24380	24380	24380	24380	24380	24380	24380	24380	24380	450800
3010	3010	3010	3010	3010	3010	3010	3010	3010	3010	3010	55510
7820	7820	7820	7820	7820	7820	6440	7820	7820	7820	7820	142600
129180	118660	118660	118660	118660	118660	118500	118660	118660	118660	118660	2323840
					1186440						2323840

