

388-112
PROVISIONAL MAJ
1994



67977

VEHICLE OPERATING COSTS

(An update of NTRC's Vehicle Operating Costs of 1985)

-79

NTRC - 172

ABDUL MAJEED
CHIEF

April 24, 1994

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I

INTRODUCTION

I. INTRODUCTION

These vehicle operating costs are an update of NTRC's Vehicle operating cost of 1985 (NTRC-79), to current prices of vehicles, tyres and POL, etc.

The physical characteristics of vehicles and road conditions used for estimation of vehicle operating costs are given in table 1 and 2 below.

Table 1 - Vehicle Characteristics

SNo	Vehicle Type	Tare weight Kg	Avg pay load Kg	No of tyres
1	Car - Toyota Corolla	1100	200	4
2	Wagon - Toyota Hiace	1800	800	4
3	Bus - Bedford+Hino Ak174	7500	3500	6
4	Truck - Isuu FTR 12K	5200	7800	6

Table 2 - Road Conditions

Sno	Road Condition	Gradient m/km	Curvature deg/km	Roughness m/km
1	Improved	10	100	105
2	Un-improved	20	200	305
3	Gravel	20	200	5.5

The prices of vehicles, tyres and pol, in financial and economic terms, i.e. including and excluding taxes and transfer payment, used in this exercise are given in Table 3 below. The economic costs (prices excluding taxes) have been worked out backward from retail prices by deducting various taxes and duties.

The price of car is based on a recent advertisement by the Manufacturers. The price of bus is an average of Bedford and Hino Chasis plus cost of body. Prices of Wagons and Trucks have been taken from the Ministry of Local Government and Rural Development, "Pakistan Road Maintenance Management System" project report on Vehicle Operating Costs Guidelines, by Kampsax Int. and Indus Associated Consultants, April, 1993.

Table 3 – Prices and Costs

Sno	Item	Financial Inc. taxes	Economic Excl. taxes
<u>VEHICLES</u>			
1	car	474480	223042
2	wagon	459168	288398
3	bus	827750	570528
4	truck	626529	412302
<u>TYRES</u>			
5	car	1130	639
6	wagon	1935	1095
7	bus	5375	3041
8	truck	5730	3242
<u>POL</u>			
9	petrol	14.28	8.43
10	diesel	6.12	4.84
11	oil	40	30

Further details of price composition of vehicles and tyres are given in Table 4 that follows.

PRICE COMPOSITION OF VEHICLES AND TYRES

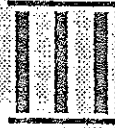
sno	component	sedan	wgn	bus	trk
VEHICLES					
1	cif	1	1	1	1
2	fix freight (1*.077)	0.077	0.077	0.077	0.077
3	imp lic fee (1*2.5%)	0.025	0.025	0.025	0.025
4	imp duty %	0.9693	0.3231	0.3231	0.3231
5	s/charge (1+2)*5%	0.054	0.054	0.054	0.054
6	iqra (1+2)*5%	0.054	0.054	0.054	0.054
7	flood relief 1%	0.011	0.011	0.011	0.011
8	octroi 1.5 %	0.0162	0.0162	0.0162	0.0162
9	total	2.2059	1.5597	1.5597	1.5597
10	markup 12.5 %	0.2757	0.1950	0.1950	0.1950
11	Total	2.4817	1.7547	1.7547	1.7547
12	sales tax 15%	0.3722	0.2632	0.2632	0.2632
13	total cost	2.8539	2.0179	2.0179	2.0179
14	income tax 2.5 %	0.0713	0.0504	0.0504	0.0504
15	sale price	2.9253	2.0683	2.0683	2.0683
15	tax comp.	1.5475	0.7714	0.7714	0.7714
16	tax comp. %	52.90	37.29	37.29	37.29
17	market price	479000	466908	620000	576909
18	economic cost	225599	292777	388775	361754
19	cost of body	0	0	200000	70000
20	excise duty 5 %	0	0	10000	3500
21	sales tax 15 %	0	0	30000	10500
22	Financial Cost	479000	466908	860000	660909
23	Economic Cost	225599	292777	588775	431754
		toyota corolla	toyota hiace	avg bdf & hino	isuzu kmpsx
TYRES					
1	size	155x13	600x14	8.25x20	8.25x20
2	fob/cif	1	1	1	1
3	import duty	0.7	0.7	0.7	0.7
4	sales tax 15 %	0.255	0.255	0.255	0.255
5	landed cost	1.955	1.955	1.955	1.955
6	markup 12.5 %	0.244	0.244	0.244	0.244
7	sale price	2.199	2.199	2.199	2.199
8	tax component	0.955	0.955	0.955	0.955
9	tax comp. %	43.42	43.42	43.42	43.42
10	market price	1130	1935	5375	5730
11	economic cost	639	1095	3041	3242
12	No of tyres	4	4	6	6
13	cost - financial	4520	7740	32250	34380
14	cost - economic	2557	4379	18247	19452
cost of vehicles excl. tyre					
	financial	474480	459168	827750	626529
	economic	223042	288398	570528	412302

II

SUMMARY

SUMMARY OF VEHICLE OPERATING COSTS (Per Km)

Vehicle Type	speed	financial costs			economic costs		
		imprvd	unimp	gravel	imprvd	unimp	gravel
CAR	30	8.21	9.81	11.91	5.80	6.86	8.27
	40	7.12	8.73	10.86	4.98	6.05	7.47
	50	6.59	8.27	10.47	4.56	5.66	7.12
	60	6.26	8.02	10.28	4.29	5.43	6.92
	70	6.11	7.97	10.37	4.14	5.34	6.90
	80	6.22	8.26	10.85	4.16	5.45	7.11
	90	6.67	9.31	12.46	4.39	5.99	7.94
WAGON	30	5.58	7.11	8.56	4.14	5.09	5.97
	40	4.84	6.39	7.87	3.55	4.51	5.40
	50	4.38	6.02	7.61	3.18	4.19	5.14
	60	4.14	5.87	7.54	3.00	4.05	5.04
	70	4.00	5.89	7.72	2.89	4.03	5.10
	80	3.96	6.07	8.15	2.85	4.11	5.31
	90	4.06	6.83	9.66	2.90	4.50	6.09
BUS	30	10.00	11.90	13.60	8.50	9.97	11.29
	40	8.59	10.49	12.21	7.20	8.68	10.01
	50	7.84	9.88	11.67	6.46	8.01	9.38
	60	7.71	9.88	11.73	6.25	7.86	9.26
	70	8.17	10.68	12.60	6.51	8.31	9.74
	80	8.67	11.64	13.74	6.74	8.80	10.32
	90	10.38	15.06	17.62	7.69	10.65	12.41
TRUCK	30	8.88	9.98	11.70	7.22	8.09	9.45
	40	7.51	8.61	10.35	6.06	6.93	8.31
	50	7.17	8.39	10.21	5.71	6.64	8.06
	60	6.96	8.33	10.22	5.46	6.46	7.92
	70	7.09	8.77	10.72	5.50	6.68	8.16
	80	7.90	10.03	12.13	6.04	7.46	9.02



CARS

VEHICLE OPERATING COSTS (Rs./1000 Km.)

SNo	Variables	Unit	C A R - Kilometer per hour						
			30	40	50	60	70	80	90
A. VARIABLES									
1	fuel consumpt	ltrs	68	62	70	79	91	111	139
2	Add for	10	17.22	17.22	17.22	17.22	17.22	17.22	17.22
	rate of	20	34.43	34.43	34.43	34.43	34.43	34.43	34.43
	rise	30	51.65	51.65	51.65	51.65	51.65	51.65	51.65
		40	68.86	68.86	68.86	68.86	68.86	68.86	68.86
		50	86.08	86.08	86.08	86.08	86.08	86.08	86.08
		60	103.29	103.29	103.29	103.29	103.29	103.29	103.29
		70	120.51	120.51	120.51	120.51	120.51	120.51	120.51
		80	137.72	137.72	137.72	137.72	137.72	137.72	137.72
		90	146.33	146.33	146.33	146.33	146.33	146.33	146.33
3	deduct for	10	9.22	9.22	9.22	9.22	9.22	9.22	9.22
	rate of	20	18.45	18.45	18.45	18.45	18.45	18.45	18.45
	fall	30	27.67	27.67	27.67	27.67	27.67	27.67	27.67
		40	36.89	36.89	36.89	36.89	36.89	36.89	36.89
		50	46.12	46.12	46.12	46.12	46.12	46.12	46.12
		60	55.34	55.34	55.34	55.34	55.34	55.34	55.34
		70	64.56	64.56	64.56	64.56	64.56	64.56	64.56
		80	70.79	70.79	70.79	70.79	70.79	70.79	70.79
		90	78.4	78.4	78.4	78.4	78.4	78.4	78.4
4	% increase	10					2	3	4
	for deg.	20					3	5	9
	curvature	30				4	8	14	24
		40			3	6	14	22	38
		50			6	9	28	47	
		60		2	10	22	41		
		70		5	15	36			
		80		6	26	50			
		90	3	13	44				
5	add for	1.5	1.83	1.83	1.83	1.83	1.83	1.83	1.83
	roughness	2.0	2.44	2.44	2.44	2.44	2.44	2.44	2.44
		2.5	3.05	3.05	3.05	3.05	3.05	3.05	3.05
		3.0	3.66	3.66	3.66	3.66	3.66	3.66	3.66
		3.5	4.27	4.27	4.27	4.27	4.27	4.27	4.27
		4.0	4.88	4.88	4.88	4.88	4.88	4.88	4.88
		4.5	5.49	5.49	5.49	5.49	5.49	5.49	5.49
		5.0	6.1	6.10	6.10	6.10	6.10	6.10	6.10
		5.5	6.71	6.71	6.71	6.71	6.71	6.71	6.71
		6.0	7.32	7.32	7.32	7.32	7.32	7.32	7.32
		6.5	7.93	7.93	7.93	7.93	7.93	7.93	7.93
		7.0	8.54	8.54	8.54	8.54	8.54	8.54	8.54
		7.5	9.15	9.15	9.15	9.15	9.15	9.15	9.15
6	% increase	40			2	13	23	37	53
	for cong.	50				9	18	30	42
	operating	60					10	20	30
	sped	70					5	10	20
		80						4	12
		88							5

VEHICLE OPERATING COSTS (Rs./1000 Km.)

SNo	Variables	Unit	C A R - Kilometer per hour						
			30	40	50	60	70	80	90
7	add ltrs to	stop	0.01	0.02	0.03	0.04	0.04	0.05	0.06
	for speed	10	0.01	0.01	0.02	0.03	0.03	0.04	0.04
	reduced to	20	0.01	0.01	0.01	0.02	0.03	0.04	0.04
	& returned	30			0.01	0.02	0.03	0.03	0.04
	from	40				0.02	0.03	0.03	0.04
		50				0.01	0.02	0.03	0.03
		60				0.01	0.01	0.02	0.03
		70						0.01	0.02
	80							0.01	
8	Engine oil	ltrs	1.44	1.44	1.44	1.44	1.44	1.20	1.20
9	tyre wear	1.50	0.01	0.01	0.02	0.02	0.03	0.03	0.04
	for	2.00	0.01	0.01	0.02	0.02	0.03	0.03	0.04
	roughness	2.50	0.02	0.03	0.04	0.05	0.05	0.06	0.08
		3.00	0.03	0.04	0.05	0.06	0.08	0.09	0.12
		3.50	0.04	0.05	0.07	0.09	0.10	0.12	0.15
		4.00	0.05	0.06	0.08	0.10	0.12	0.15	0.19
		4.50	0.06	0.07	0.10	0.12	0.15	0.18	0.23
		5.00	0.06	0.09	0.11	0.14	0.17	0.21	0.26
		5.50	0.07	0.10	0.13	0.16	0.20	0.24	0.30
		6.00	0.08	0.11	0.15	0.18	0.22	0.27	0.34
	6.50	0.09	0.12	0.16	0.20	0.25	0.29	0.38	
	7.00	0.10	0.13	0.18	0.22	0.27	0.32	0.41	
	7.50	0.11	0.14	0.19	0.25	0.29	0.35	0.45	
10	% increase	100			27	38	49	70	112
	due to	200			45	66	107	150	272
	curvature	300			68	113	185	280	563
	(deg.per km)	400		10	118	197	282	440	
		500	10	40	188	291	428	730	
		600	28	80	270	413	710		
		700	47	120	423	638			
		800	75	180	663				
	900	141	280						
11	% increase	40			26	79	118	166	209
	due to	50				46	76	112	201
	congestion	60				20	45	75	143
	op spd	70					15	33	85
		80						12	53

VEHICLE OPERATING COSTS (Rs./1000 Km.)

SNo	Variables	Unit	C A R - Kilometer per hour						
			30	40	50	60	70	80	90
12	labour	1.0	1.99	1.99	1.99	1.99	1.99	1.99	1.99
	hours	1.5	2.59	2.59	2.59	2.59	2.59	2.59	2.59
	for	2.0	3.19	3.19	3.19	3.19	3.19	3.19	3.19
	roughness	2.5	3.79	3.79	3.79	3.79	3.79	3.79	3.79
		3.0	4.39	4.39	4.39	4.39	4.39	4.39	4.39
		3.5	4.99	4.99	4.99	4.99	4.99	4.99	4.99
		4.0	5.59	5.59	5.59	5.59	5.59	5.59	5.59
		4.5	6.19	6.19	6.19	6.19	6.19	6.19	6.19
		5.0	6.79	6.79	6.79	6.79	6.79	6.79	6.79
		5.5	7.38	7.38	7.38	7.38	7.38	7.38	7.38
		6.0	7.98	7.98	7.98	7.98	7.98	7.98	7.98
		6.5	8.58	8.58	8.58	8.58	8.58	8.58	8.58
		7.0	9.18	9.18	9.18	9.18	9.18	9.18	9.18
		7.5	9.78	9.78	9.78	9.78	9.78	9.78	9.78
13	maint parts	1.0	0.0261	0.0261	0.0261	0.0261	0.0261	0.0261	0.0261
	% of new veh	1.5	0.0461	0.0461	0.0461	0.0461	0.0461	0.0461	0.0461
	price for	2.0	0.0688	0.0688	0.0688	0.0688	0.0688	0.0688	0.0688
	roughness	2.5	0.1095	0.1095	0.1095	0.1095	0.1095	0.1095	0.1095
	meters/km	3.0	0.1930	0.1930	0.1930	0.1930	0.1930	0.1930	0.1930
		3.5	0.2764	0.2764	0.2764	0.2764	0.2764	0.2764	0.2764
		4.0	0.3599	0.3599	0.3599	0.3599	0.3599	0.3599	0.3599
		4.5	0.4433	0.4433	0.4433	0.4433	0.4433	0.4433	0.4433
		5.0	0.5267	0.5267	0.5267	0.5267	0.5267	0.5267	0.5267
		5.5	0.6102	0.6102	0.6102	0.6102	0.6102	0.6102	0.6102
		6.0	0.6936	0.6936	0.6936	0.6936	0.6936	0.6936	0.6936
		6.5	0.7771	0.7771	0.7771	0.7771	0.7771	0.7771	0.7771
		7.0	0.8695	0.8695	0.8695	0.8695	0.8695	0.8695	0.8695
		7.5	0.9440	0.9440	0.9440	0.9440	0.9440	0.9440	0.9440
14	dep. vehprice		0.0048	0.0043	0.0040	0.0038	0.0036	0.0034	0.0033
15	int vehprice/2		0.0047	0.0039	0.0034	0.0030	0.0027	0.0025	0.0023
16	time	hrs	33.3	25.0	20.0	16.7	14.3	12.5	11.1
17	value	rs/hrs	35.00	35.00	35.00	35.00	35.00	35.00	35.00
B	MARKET PRICES								
1	fuel	litres	14.28	14.28	14.28	14.28	14.28	14.28	14.28
2	oil	litres	40.00	40.00	40.00	40.00	40.00	40.00	40.00
3	tyre	unit	1130	1130	1130	1130	1130	1130	1130
4	maint lbr	rs/hr	20.00	20.00	20.00	20.00	20.00	20.00	20.00
5	vehicle	rs	474480	474480	474480	474480	474480	474480	474480
6	time	hrs	35.00	35.00	35.00	35.00	35.00	35.00	35.00
C	FACTOR COSTS								
1	fuel	litres	8.43	8.43	8.43	8.43	8.43	8.43	8.43
2	oil	litres	30.00	30.00	30.00	30.00	30.00	30.00	30.00
3	tyre	unit	639.00	639.00	639.00	639.00	639.00	639.00	639.00
4	maint lbr	rs/hr	20	20	20	20	20	20	20
5	vehicle	rs	223042	223042	223042	223042	223042	223042	223042
6	time	hrs	35.00	35.00	35.00	35.00	35.00	35.00	35.00

VEHICLE OPERATING COSTS (Rs./1000 Km.)

SNo	Variables	Unit	C A R - Kilometer per hour						
			30	40	50	60	70	80	90
D. IMPROVED ROADS									
(i) QUANTITIES									
1	fuel	litres	78.03	72.23	80.43	89.63	103.45	129.6	172.27
2	oil	litres	1.44	1.44	1.44	1.44	1.44	1.2	1.2
3	tyre	unit	0.009	0.012	0.02032	0.03036	0.03874	0.0546	0.09805
4	maint lbr	hrs	2.59	2.59	2.59	2.59	2.59	2.59	2.59
5	maint prts	veh	0.000461	0.000461	0.000461	0.000461	0.000461	0.000461	0.000461
6	dep	veh	0.004775	0.004316	0.003993	0.00375	0.003575	0.003428	0.003303
7	int	veh	0.004650	0.003883	0.003370	0.003	0.002702	0.002465	0.002281
8	time	hrs	33.33	25.00	20.00	16.67	14.29	12.50	11.11
(ii) FINCNIAL COSTS									
1	fuel		1114.27	1031.44	1148.54	1279.92	1477.27	1850.69	2460.02
2	oil		57.60	57.60	57.60	57.60	57.60	48.00	48.00
3	tyre		16.08	21.44	36.31	54.25	69.23	97.57	175.22
4	maint lbr		51.80	51.80	51.80	51.80	51.80	51.80	51.80
5	maint prts		270.54	270.54	270.54	270.54	270.54	270.54	270.54
6	dep		2802.37	2533.03	2343.78	2200.70	2098.00	2012.09	1938.71
7	int		2729.31	2278.98	1978.15	1760.56	1586.09	1449.43	1338.96
8	time		1166.67	875.00	700.00	583.33	500.00	437.50	388.89
	Total		8208.65	7119.84	6586.73	6258.69	6110.52	6217.61	6672.13
(iii) ECONOMIC COSTS									
1	fuel		657.79	608.90	678.02	755.58	872.08	1092.53	1452.24
2	oil		43.20	43.20	43.20	43.20	43.20	36.00	36.00
3	tyre		8.30	11.06	18.74	27.99	35.72	50.34	90.40
4	maint lbr		51.80	51.80	51.80	51.80	51.80	51.80	51.80
5	maint prts		180.53	180.53	180.53	180.53	180.53	180.53	180.53
6	dep		1870.03	1690.29	1564.01	1468.53	1400.00	1342.67	1293.70
7	int		1821.27	1520.76	1320.02	1174.82	1058.40	967.20	893.49
8	time		1166.67	875.00	700.00	583.33	500.00	437.50	388.89
	Total		5799.59	4981.55	4556.32	4285.78	4141.73	4158.57	4387.05

VEHICLE OPERATING COSTS (Rs./1000 Km.)

SNo	Variables	Unit	C A R - Kilometer per hour						
			30	40	50	60	70	80	90
E. UN-IMPROVED ROADS									
(i) QUANTITIES									
1	fuel	litres	88.45	82.65	90.85	100.05	114.78	142.24	189.64
2	oil	litres	1.44	1.44	1.44	1.44	1.44	1.2	1.2
3	tyre	unit	0.037	0.049	0.09425	0.14774	0.207	0.3144	0.65025
4	maint lbr	hrs	4.99	4.99	4.99	4.99	4.99	4.99	4.99
5	maint prts	veh	0.002764	0.002764	0.002764	0.002764	0.002764	0.002764	0.002764
6	dep	veh	0.004775	0.004316	0.003993	0.00375	0.003575	0.003428	0.003303
7	int	veh	0.004650	0.003883	0.003370	0.003	0.002702	0.002469	0.002281
8	time	hrs	33.33	25.00	20.00	16.67	14.29	12.50	11.11
(ii) FINCNIAL COSTS									
1	fuel		1263.07	1180.24	1297.34	1428.71	1639.06	2031.19	2708.06
2	oil		57.60	57.60	57.60	57.60	57.60	48.00	48.00
3	tyre		66.12	87.56	168.42	264.01	369.91	561.83	1162.00
4	maint lbr		99.80	99.80	99.80	99.80	99.80	99.80	99.80
5	maint prts		1622.06	1622.06	1622.06	1622.06	1622.06	1622.06	1622.06
6	dep		2802.37	2533.03	2343.78	2200.70	2098.00	2012.09	1938.71
7	int		2729.31	2278.98	1978.15	1760.56	1586.09	1449.43	1338.96
8	time		1166.67	875.00	700.00	583.33	500.00	437.50	388.89
	Total		9807.00	8734.27	8267.16	8016.77	7972.51	8261.89	9306.48
(iii) ECONOMIC COSTS									
1	fuel		745.63	696.74	765.87	843.42	967.60	1199.08	1598.67
2	oil		43.20	43.20	43.20	43.20	43.20	36.00	36.00
3	tyre		34.11	45.18	86.90	136.22	190.85	289.88	599.53
4	maint lbr		99.80	99.80	99.80	99.80	99.80	99.80	99.80
5	maint prts		1082.40	1082.40	1082.40	1082.40	1082.40	1082.40	1082.40
6	dep		1870.03	1690.29	1564.01	1468.53	1400.00	1342.67	1293.70
7	int		1821.27	1520.76	1320.02	1174.82	1058.40	967.20	893.49
8	time		1166.67	875.00	700.00	583.33	500.00	437.50	388.89
	Total		6863.12	6053.38	5662.20	5431.72	5342.24	5454.53	5992.48

VEHICLE OPERATING COSTS (Rs./1000 Km.)

SNo	Variables	Unit	C A R - Kilometer per hour						
			30	40	50	60	70	80	90
F. GRAVEL ROADS									
(i) QUANTITIES									
1	fuel	litres	90.89	85.09	93.29	102.49	117.22	144.68	192.08
2	oil	litres	1.44	1.44	1.44	1.44	1.44	1.2	1.2
3	tyre	unit	0.073	0.097	0.18705	0.27224	0.40779	0.61832	1.275
4	maint lbr	hrs	7.38	7.38	7.38	7.38	7.38	7.38	7.38
5	maint prts	veh	0.006102	0.006102	0.006102	0.006102	0.006102	0.006102	0.006102
6	dep	veh	0.004775	0.004316	0.003993	0.00375	0.003575	0.003428	0.003303
7	int	veh	0.004650	0.003883	0.003370	0.003	0.002702	0.002469	0.002281
8	time	hrs	33.33	25.00	20.00	16.67	14.29	12.50	11.11
(ii) FINCNIAL COSTS									
1	fuel		1297.91	1215.09	1332.18	1463.56	1673.90	2066.03	290
2	oil		57.60	57.60	57.60	57.60	57.60	48.00	48.00
3	tyre		130.45	173.34	334.26	486.49	728.72	1104.94	2284.43
4	maint lbr		147.60	147.60	147.60	147.60	147.60	147.60	147.60
5	maint prts		3580.97	3580.97	3580.97	3580.97	3580.97	3580.97	3580.97
6	dep		2802.37	2533.03	2343.78	2200.70	2098.00	2012.09	1938.71
7	int		2729.31	2278.98	1978.15	1760.56	1586.09	1449.43	1338.96
8	time		1166.67	875.00	700.00	583.33	500.00	437.50	388.89
	Total		11912.89	10861.60	10474.55	10280.81	10372.88	10846.55	12464.46
(iii) ECONOMIC COSTS									
1	fuel		766.20	717.31	786.43	863.99	988.16	1219.65	1619.23
2	oil		43.20	43.20	43.20	43.20	43.20	36.00	36.00
3	tyre		67.31	89.43	172.46	251.01	375.98	570.09	1175.55
4	maint lbr		147.60	147.60	147.60	147.60	147.60	147.60	147.60
5	maint prts		2389.59	2389.59	2389.59	2389.59	2389.59	2389.59	2389.59
6	dep		1870.03	1690.29	1564.01	1468.53	1400.00	1342.67	1293.70
7	int		1821.27	1520.76	1320.02	1174.82	1058.40	967.20	893.49
8	time		1166.67	875.00	700.00	583.33	500.00	437.50	388.89
	Total		8271.86	7473.19	7123.31	6922.06	6902.93	7110.30	7944.05

IV

WAGONS

VEHICLE OPERATING COSTS (Rs./1000 Km.)

SNo	Variables	Unit	W A G O N - Kilometer per hour						
			30	40	50	60	70	80	90
A. VARIABLES									
1	fuel consumpt	ltrs	87	75	67	75	86	98	106
2	Add for	10	31.39	31.39	31.39	31.39	31.39	31.39	31.39
	rate of	20	62.77	62.77	62.77	62.77	62.77	62.77	62.77
	rise	30	94.15	94.15	94.15	94.15	94.15	94.15	94.15
		40	125.54	125.54	125.54	125.54	125.54	125.54	125.54
		50	156.92	156.92	156.92	156.92	156.92	156.92	156.92
		60	188.31	188.31	188.31	188.31	188.31	188.31	188.31
		70	219.69	219.69	219.69	219.69	219.69	219.69	219.69
		80	251.08	251.08	251.08	251.08	251.08	251.08	251.08
		90	266.77	266.77	266.77	266.77	266.77	266.77	266.77
3	deduct for	10	13.79	13.79	13.79	13.79	13.79	13.79	13.79
	rate of	20	27.58	27.58	27.58	27.58	27.58	27.58	27.58
	fall	30	41.38	41.38	41.38	41.38	41.38	41.38	41.38
		40	55.17	55.17	55.17	55.17	55.17	55.17	55.17
		50	68.96	68.96	68.96	68.96	68.96	68.96	68.96
		60	82.75	82.75	82.75	82.75	82.75	82.75	82.75
		70	96.54	96.54	96.54	96.54	96.54	96.54	96.54
		80	110.33	110.33	110.33	110.33	110.33	110.33	110.33
		90	117.23	117.23	117.23	117.23	117.23	117.23	117.23
4	% increase	10						1	2
	for deg.	20					3	5	6
	curvature	30				2	5	14	22
		40			2	5	12	20	
		50			3	8	26		
		60			6	17			
		70		4	12	30			
		80		6	16				
		90	7	25					
5	add for	1.5	1.78	1.78	1.78	1.78	1.78	1.78	1.78
	roughness	2.0	2.38	2.38	2.38	2.38	2.38	2.38	2.38
		2.5	2.97	2.97	2.97	2.97	2.97	2.97	2.97
		3.0	3.57	3.57	3.57	3.57	3.57	3.57	3.57
		3.5	4.16	4.16	4.16	4.16	4.16	4.16	4.16
		4.0	4.75	4.75	4.75	4.75	4.75	4.75	4.75
		4.5	5.35	5.35	5.35	5.35	5.35	5.35	5.35
		5.0	5.94	5.94	5.94	5.94	5.94	5.94	5.94
		5.5	6.53	6.53	6.53	6.53	6.53	6.53	6.53
		6.0	7.13	7.13	7.13	7.13	7.13	7.13	7.13
		6.5	7.72	7.72	7.72	7.72	7.72	7.72	7.72
		7.0	8.32	8.32	8.32	8.32	8.32	8.32	8.32
		7.5	8.91	8.91	8.91	8.91	8.91	8.91	8.91
6	% increase	40			2	13	23	37	53
	for cong.	50				9	18	30	42
	operating	60					10	20	30
	sped	70					5	10	20
		80						4	12
		88							5

VEHICLE OPERATING COSTS (Rs./1000 Km.)

SNo	Variables	Unit	W A G O N - Kilometer per hour						
			30	40	50	60	70	80	90
7	add ltrs to	stop	0.06	0.08	0.11	0.15	0.18	0.22	0.25
	for speed	10	0.05	0.07	0.1	0.14	0.18	0.2	0.24
	reduced to	20	0.03	0.06	0.08	0.12	0.16	0.18	0.21
	& returned	30		0.03	0.05	0.1	0.14	0.16	0.19
	from	40			0.03	0.08	0.12	0.15	0.17
		50				0.05	0.1	0.13	0.15
		60					0.07	0.10	0.13
		70						0.05	0.09
		80							0.06
8	Engine oil	ltrs	2.16	2.16	2.16	2.16	2.16	1.80	2.16
9	tyre wear	1.50	0.01	0.01	0.02	0.02	0.03	0.04	0.05
	for	2.00	0.01	0.02	0.02	0.03	0.03	0.04	0.05
	roughness	2.50	0.02	0.03	0.04	0.05	0.06	0.07	0.09
		3.00	0.03	0.04	0.07	0.07	0.09	0.11	0.14
		3.50	0.04	0.06	0.08	0.10	0.12	0.14	0.18
		4.00	0.05	0.07	0.10	0.12	0.15	0.18	0.22
		4.50	0.06	0.08	0.11	0.14	0.17	0.21	0.27
		5.00	0.07	0.10	0.13	0.17	0.20	0.24	0.31
		5.50	0.08	0.11	0.15	0.19	0.23	0.28	0.35
		6.00	0.09	0.13	0.17	0.21	0.26	0.31	0.40
	6.50	0.10	0.14	0.19	0.24	0.29	0.35	0.44	
	7.00	0.11	0.15	0.21	0.26	0.31	0.38	0.48	
	7.50	0.12	0.17	0.23	0.28	0.34	0.42	0.53	
10	% increase	100			27	38	49	70	112
	due to	200			45	66	107	150	272
	curvature	300			68	113	185	280	563
	(deg.per km)	400		10	118	197	282	440	
		500	10	40	188	291	428	730	
		600	28	80	270	413	710		
		700	47	120	423	638			
		800	75	180	663				
		900	141	280					
11	% increase	40			26	79	118	166	209
	due to	50				46	76	112	201
	congestion	60				20	45	75	143
	op spd	70					15	33	85
		80						12	53

OPERATING COSTS (Rs./1000 Km.)

SNo	Variables	Unit	W A G O N - Kilometer per hour						
			30	40	50	60	70	80	90
D. IMPROVED ROADS									
(i) QUANTITIES									
1	fuel	litres	107.58	95.98	88.58	97.38	108.98	126.68	145.22
2	oil	litres	2.16	2.16	2.16	2.16	2.16	1.8	2.16
3	tyre	unit	0.011	0.014	0.02413	0.03312	0.04321	0.0637	0.11925
4	maint lbr	hrs	17.04	17.04	17.04	17.04	17.04	17.04	17.04
5	maint prts	veh	0.000612	0.000612	0.000612	0.000612	0.000612	0.000612	0.000612
6	dep	veh	0.002865	0.002589	0.002396	0.00225	0.002145	0.002057	0.001982
7	int	veh	0.001860	0.001553	0.001348	0.0012	0.001081	0.000987	0.000912
8	time	hrs	33.33	25.00	20.00	16.67	14.29	12.50	11.11
(ii) FINCNCIAL COSTS									
1	fuel		658.39	587.40	542.11	595.97	666.96	775.28	888.75
2	oil		86.40	86.40	86.40	86.40	86.40	72.00	86.40
3	tyre		21.86	27.82	47.95	65.81	85.86	126.57	236.95
4	maint lbr		340.80	340.80	340.80	340.80	340.80	340.80	340.80
5	maint prts		358.66	358.66	358.66	358.66	358.66	358.66	358.66
6	dep		1679.13	1517.75	1404.35	1318.62	1257.08	1205.61	1161.64
7	int		1090.24	910.35	790.18	703.26	633.57	578.98	534.85
8	time		1341.67	1006.25	805.00	670.83	575.00	503.13	447.22
	Total		5577.15	4835.42	4375.45	4140.35	4004.33	3961.03	4055.28
(iii) ECONOMIC COSTS									
1	fuel		520.69	464.54	428.73	471.32	527.46	613.13	702.86
2	oil		64.80	64.80	64.80	64.80	64.80	54.00	64.80
3	tyre		11.29	14.36	24.76	33.98	44.33	65.36	122.35
4	maint lbr		340.80	340.80	340.80	340.80	340.80	340.80	340.80
5	maint prts		213.32	213.32	213.32	213.32	213.32	213.32	213.32
6	dep		998.71	902.72	835.28	784.28	747.68	717.07	690.92
7	int		648.45	541.45	469.98	418.28	376.83	344.36	318.12
8	time		1341.67	1006.25	805.00	670.83	575.00	503.13	447.22
	Total		4139.72	3548.26	3182.67	2997.62	2890.24	2851.17	2900.40

VEHICLE OPERATING COSTS (Rs./1000 Km.)

SNo	Variables	Unit	W A G O N - Kilometer per hour						
			30	40	50	60	70	80	90
E. UN-IMPROVED ROADS									
(i) QUANTITIES									
1	fuel	litres	127.55	115.95	108.55	117.35	131.53	150.57	169.43
2	oil	litres	2.16	2.16	2.16	2.16	2.16	1.8	2.16
3	tyre	unit	0.041	0.056	0.11165	0.16102	0.24219	0.37204	0.76075
4	maint lbr	hrs	19.47	19.47	19.47	19.47	19.47	19.47	19.47
5	maint prts	veh	0.002835	0.002835	0.002835	0.002835	0.002835	0.002835	0.002835
6	dep	veh	0.002865	0.002589	0.002396	0.00225	0.002145	0.002057	0.001982
7	int	veh	0.001860	0.001553	0.001348	0.0012	0.001081	0.000987	0.000912
8	time	hrs	33.33	25.00	20.00	16.67	14.29	12.50	11.11
(ii) FINCNIAL COSTS									
1	fuel		780.61	709.61	664.33	718.18	804.96	921.49	1036.91
2	oil		86.40	86.40	86.40	86.40	86.40	72.00	86.40
3	tyre		81.47	111.27	221.85	319.95	481.23	739.24	1511.61
4	maint lbr		389.40	389.40	389.40	389.40	389.40	389.40	389.40
5	maint prts		1661.46	1661.46	1661.46	1661.46	1661.46	1661.46	1661.46
6	dep		1679.13	1517.75	1404.35	1318.62	1257.08	1205.61	1161.64
7	int		1090.24	910.35	790.18	703.26	633.57	578.98	534.85
8	time		1341.67	1006.25	805.00	670.83	575.00	503.13	447.22
	Total		7110.37	6392.49	6022.97	5868.10	5889.11	6071.30	6829.50
(iii) ECONOMIC COSTS									
1	fuel		617.34	561.20	525.38	567.97	636.61	728.76	820.04
2	oil		64.80	64.80	64.80	64.80	64.80	54.00	64.80
3	tyre		42.07	57.46	114.55	165.21	248.49	381.71	780.53
4	maint lbr		389.40	389.40	389.40	389.40	389.40	389.40	389.40
5	maint prts		988.20	988.20	988.20	988.20	988.20	988.20	988.20
6	dep		998.71	902.72	835.28	784.28	747.68	717.07	690.92
7	int		648.45	541.45	469.98	418.28	376.83	344.36	318.12
8	time		1341.67	1006.25	805.00	670.83	575.00	503.13	447.22
	Total		5090.63	4511.47	4192.59	4048.98	4027.00	4106.62	4499.22

VEHICLE OPERATING COSTS (Rs./1000 Km.)

SNo	Variables	Unit	W A G O N - Kilometer per hour					
			30	40	50	60	70	80

F. GRAVEL ROADS

(i) QUANTITIES

1	fuel	litres	129.92	118.32	110.92	119.72	133.9	152.94	171.8
2	oil	litres	2.16	2.16	2.16	2.16	2.16	1.8	2.16
3	tyre	unit	0.082	0.111	0.2204	0.3154	0.47403	0.73098	1.496
4	maint lbr	hrs	21.89	21.89	21.89	21.89	21.89	21.89	21.89
5	maint prts	veh	0.005059	0.005059	0.005059	0.005059	0.005059	0.005059	0.005059
6	dep	veh	0.002865	0.002589	0.002396	0.00225	0.002145	0.002057	0.001982
7	int	veh	0.001860	0.001553	0.001348	0.0012	0.001081	0.000987	0.000912
8	time	hrs	33.33	25.00	20.00	16.67	14.29	12.50	11.11

(ii) FINANCIAL COSTS

1	fuel		795.11	724.12	678.83	732.69	819.47	935.99	1051.42
2	oil		86.40	86.40	86.40	86.40	86.40	72.00	86.40
3	tyre		162.93	220.56	437.93	626.70	941.90	1452.46	2972.55
4	maint lbr		437.80	437.80	437.80	437.80	437.80	437.80	437.80
5	maint prts		2964.84	2964.84	2964.84	2964.84	2964.84	2964.84	2964.84
6	dep		1679.13	1517.75	1404.35	1318.62	1257.08	1205.61	1161.64
7	int.		1090.24	910.35	790.18	703.26	633.57	578.98	534.85
8	time		1341.67	1006.25	805.00	670.83	575.00	503.13	447.22
	Total		8558.12	7868.06	7605.34	7541.14	7716.06	8150.80	9656.72

(iii) ECONOMIC COSTS

1	fuel		628.81	572.67	536.85	579.44	648.08	740.23	831.51
2	oil		64.80	64.80	64.80	64.80	64.80	54.00	64.80
3	tyre		84.13	113.89	226.13	323.60	486.35	749.99	1534.90
4	maint lbr		437.80	437.80	437.80	437.80	437.80	437.80	437.80
5	maint prts		1763.42	1763.42	1763.42	1763.42	1763.42	1763.42	1763.42
6	dep		998.71	902.72	835.28	784.28	747.68	717.07	690.92
7	int		648.45	541.45	469.98	418.28	376.83	344.36	318.12
8	time		1341.67	1006.25	805.00	670.83	575.00	503.13	447.22
	Total		5967.78	5402.99	5139.26	5042.46	5099.96	5309.99	6088.68

V

BUSES

VEHICLE OPERATING COSTS (Rs./1000 Km.)

SNo	Variables	Unit	B U S - Kilometer per hour						
			30	40	50	60	70	80	90
A. VARIABLES									
1	fuel consumpt	ltrs	237	193	164	201	303	323	336
2	Add for	10	49.29	49.29	49.29	49.29	49.29	49.29	49.29
	rate of	20	98.58	98.58	98.58	98.58	98.58	98.58	98.58
	rise	30	147.87	147.87	147.87	147.87	147.87	147.87	147.87
		40	197.16	197.16	197.16	197.16	197.16	197.16	197.16
		50	246.45	246.45	246.45	246.45	246.45	246.45	246.45
		60	195.74	195.74	195.74	195.74	195.74	195.74	195.74
		70	345.03	345.03	345.03	345.03	345.03	345.03	345.03
		80	394.33	394.33	394.33	394.33	394.33	394.33	394.33
		90	418.97	418.97	418.97	418.97	418.97	418.97	418.97
3	deduct for	10	20.72	20.72	20.72	20.72	20.72	20.72	20.72
	rate of	20	41.45	41.45	41.45	41.45	41.45	41.45	41.45
	fall	30	62.17	62.17	62.17	62.17	62.17	62.17	62.17
		40	82.9	82.9	82.9	82.9	82.9	82.9	82.9
		50	103.62	103.62	103.62	103.62	103.62	103.62	103.62
		60	124.34	124.34	124.34	124.34	124.34	124.34	124.34
		70	145.07	145.07	145.07	145.07	145.07	145.07	145.07
		80	165.79	165.79	165.79	165.79	165.79	165.79	165.79
		90	176.76	176.76	176.76	176.76	176.76	176.76	176.76
4	% increase	10				1	2	4	6
	for deg.	20	1	1	1	2	5	10	16
	curvature	30	1	1	2	6	14	28	
		40	1	1	4	12	33		
		50	1	2	8	20	51		
		60	1	2	14	37			
		70	1	10	25	46			
		80	5	15	38				
		90	6	21	73				
5	add for	1.5	2.46	2.46	2.46	2.46	2.46	2.46	2.46
	roughness	2.0	3.28	3.28	3.28	3.28	3.28	3.28	3.28
		2.5	4.10	4.10	4.10	4.10	4.10	4.10	4.10
		3.0	4.92	4.92	4.92	4.92	4.92	4.92	4.92
		3.5	5.74	5.74	5.74	5.74	5.74	5.74	5.74
		4.0	6.55	6.55	6.55	6.55	6.55	6.55	6.55
		4.5	7.37	7.37	7.37	7.37	7.37	7.37	7.37
		5.0	8.19	8.19	8.19	8.19	8.19	8.19	8.19
		5.5	9.01	9.01	9.01	9.01	9.01	9.01	9.01
		6.0	9.83	9.83	9.83	9.83	9.83	9.83	9.83
		6.5	10.65	10.65	10.65	10.65	10.65	10.65	10.65
		7.0	11.47	11.47	11.47	11.47	11.47	11.47	11.47
		7.5	12.29	12.29	12.29	12.29	12.29	12.29	12.29
6	% increase	40				6	17	35	64
	for cong.	50				6	16	33	60
	operating	60					10	26	50
	sped	70					4	18	41
		80						9	29
		88							18

VEHICLE OPERATING COSTS (Rs./1000 Km.)

SNo	Variables	Unit	B U S - Kilometer per hour						
			30	40	50	60	70	80	90
12	labour	1.0	18.43	18.43	18.43	18.43	18.43	18.43	18.43
	hours	1.5	19.58	19.58	19.58	19.58	19.58	19.58	19.58
	for	2.0	20.71	20.71	20.71	20.71	20.71	20.71	20.71
	roughness	2.5	21.86	21.86	21.86	21.86	21.86	21.86	21.86
		3.0	23.00	23.00	23.00	23.00	23.00	23.00	23.00
		3.5	24.14	24.14	24.14	24.14	24.14	24.14	24.14
		4.0	25.28	25.28	25.28	25.28	25.28	25.28	25.28
		4.5	26.43	26.43	26.43	26.43	26.43	26.43	26.43
		5.0	27.58	27.58	27.58	27.58	27.58	27.58	27.58
		5.5	28.72	28.72	28.72	28.72	28.72	28.72	28.72
		6.0	29.86	29.86	29.86	29.86	29.86	29.86	29.86
		6.5	31.01	31.01	31.01	31.01	31.01	31.01	31.01
		7.0	32.15	32.15	32.15	32.15	32.15	32.15	32.15
		7.5	33.29	33.29	33.29	33.29	33.29	33.29	33.29
13	maint parts	1.0	0.0560	0.0560	0.0560	0.0560	0.0560	0.0560	0.0560
	% of new veh	1.5	0.0980	0.0980	0.0980	0.0980	0.0980	0.0980	0.0980
	price for	2.0	0.1400	0.1400	0.1400	0.1400	0.1400	0.1400	0.1400
	roughness	2.5	0.1820	0.1820	0.1820	0.1820	0.1820	0.1820	0.1820
	meters/km	3.0	0.2240	0.2240	0.2240	0.2240	0.2240	0.2240	0.2240
		3.5	0.2660	0.2660	0.2660	0.2660	0.2660	0.2660	0.2660
		4.0	0.3080	0.3080	0.3080	0.3080	0.3080	0.3080	0.3080
		4.5	0.3500	0.3500	0.3500	0.3500	0.3500	0.3500	0.3500
		5.0	0.3920	0.3920	0.3920	0.3920	0.3920	0.3920	0.3920
		5.5	0.4340	0.4340	0.4340	0.4340	0.4340	0.4340	0.4340
		6.0	0.4760	0.4760	0.4760	0.4760	0.4760	0.4760	0.4760
		6.5	0.5180	0.5180	0.5180	0.5180	0.5180	0.5180	0.5180
		7.0	0.5600	0.5600	0.5600	0.5600	0.5600	0.5600	0.5600
		7.5	0.6020	0.6020	0.6020	0.6020	0.6020	0.6020	0.6020
14	dep. vehprice		0.0023	0.0021	0.0019	0.0018	0.0017	0.0016	0.0016
15	int vehprice/2		0.0015	0.0012	0.0011	0.0010	0.0009	0.0008	0.0007
16	time	hrs	33.3	25.0	20.0	16.7	14.3	12.5	11.1
17	value	rs/hrs	94.10	94.10	94.10	94.10	94.10	94.10	94.10

B MARKET PRICES

1	fuel	litres	6.12	6.12	6.12	6.12	6.12	6.12	6.12
2	oil	litres	40.00	40.00	40.00	40.00	40.00	40.00	40.00
3	tyre	unit	5375	5375	5375	5375	5375	5375	5375
4	maint lbr	rs/hr	20.00	20.00	20.00	20.00	20.00	20.00	20.00
5	vehicle	rs	827750	827750	827750	827750	827750	827750	827750
6	time	hrs	94.10	94.10	94.10	94.10	94.10	94.10	94.10

C FACTOR COSTS

1	fuel	litres	4.84	4.84	4.84	4.84	4.84	4.84	4.84
2	oil	litres	30.00	30.00	30.00	30.00	30.00	30.00	30.00
3	tyre	unit	3041	3041	3041	3041	3041	3041	3041
4	maint lbr	rs/hr	20	20	20	20	20	20	20
5	vehicle	rs	570528	570528	570528	570528	570528	570528	570528
6	time	hrs	94.10	94.10	94.10	94.10	94.10	94.10	94.10

VEHICLE OPERATING COSTS (Rs./1000 Km.)

SNo	Variables	Unit	B U S - Kilometer per hour						
			30	40	50	60	70	80	90
D. IMPROVED ROADS									
(i) QUANTITIES									
1	fuel	litres	269.63	226.23	197.83	238.04	345.09	401.62	491.23
2	oil	litres	6.22	5.8	5.53	4.86	3.86	3.56	3.8
3	tyre	unit	0.031	0.044	0.07747	0.10764	0.14453	0.2208	0.44988
4	maint lbr	hrs	19.58	19.58	19.58	19.58	19.58	19.58	19.58
5	maint prts	veh	0.00098	0.00098	0.00098	0.00098	0.00098	0.00098	0.00098
6	dep	veh	0.002292	0.002071	0.001917	0.0018	0.001716	0.001645	0.001585
7	int	veh	0.001488	0.001242	0.001078	0.00096	0.000864	0.000790	0.000730
8	time	hrs	33.33	25.00	20.00	16.67	14.29	12.50	11.11
(ii) FINANCIAL COSTS									
1	fuel	25.9%	1650.14	1384.53	1210.72	1456.80	2111.95	2457.91	3006.33
2	oil	1.8%	248.80	232.00	221.20	194.40	154.40	142.40	152.00
3	tyre	10.8%	189.50	268.97	473.57	658.00	883.51	1349.75	2750.12
4	maint lbr	4.8%	391.60	391.60	391.60	391.60	391.60	391.60	391.60
5	maint prts	11.1%	902.88	902.88	902.88	902.88	902.88	902.88	902.88
6	dep	19.3%	2111.74	1908.78	1766.17	1658.34	1580.96	1516.22	1460.93
7	int	9.8%	1371.12	1144.89	993.76	884.45	796.80	728.15	672.65
8	time	16.5%	3136.67	2352.50	1882.00	1568.33	1344.29	1176.25	1045.56
	Total	60.0	10002.45	8586.14	7841.90	7714.81	8166.38	8665.16	10382.05
(iii) ECONOMIC COSTS									
1	fuel		1305.01	1094.95	957.50	1152.11	1670.24	1943.84	2377.55
2	oil		186.60	174.00	165.90	145.80	115.80	106.80	114.00
3	tyre		97.84	138.86	244.50	339.71	456.14	696.84	1419.82
4	maint lbr		391.60	391.60	391.60	391.60	391.60	391.60	391.60
5	maint prts		695.48	695.48	695.48	695.48	695.48	695.48	695.48
6	dep		1626.65	1470.31	1360.46	1277.41	1217.79	1167.93	1125.34
7	int		1056.16	881.90	765.49	681.28	613.77	560.89	518.14
8	time		3136.67	2352.50	1882.00	1568.33	1344.29	1176.25	1045.56
	Total		8496.01	7199.60	6462.92	6251.72	6505.10	6739.62	7687.48

Full 6.12 → 8

30-7% increase → 2760.7

Required for:
- Project Appraisal
- Fixation of fares

Und. 8815.13

7.4%

VEHICLE OPERATING COSTS (Rs./1000 Km.)

SNo	Variables	Unit	B U S - Kilometer per hour						
			30	40	50	60	70	80	90

E. UN-IMPROVED ROADS

(i) QUANTITIES

1	fuel	litres	303.84	260	231.31	271.89	386.02	452.84	556.67
2	oil	litres	6.22	5.8	5.53	4.86	3.86	3.56	3.8
3	tyre	unit	0.039	0.054	0.10875	0.15936	0.24633	0.38808	0.88072
4	maint lbr	hrs	24.14	24.14	24.14	24.14	24.14	24.14	24.14
5	maint prts	veh	0.00266	0.00266	0.00266	0.00266	0.00266	0.00266	0.00266
6	dep	veh	0.002292	0.002071	0.001917	0.0018	0.001716	0.001645	0.001585
7	int	veh	0.001488	0.001242	0.001078	0.00096	0.000864	0.000790	0.000730
8	time	hrs	33.33	25.00	20.00	16.67	14.29	12.50	11.11

(ii) FINCNICAL COSTS

1	fuel	22.1% 16.8%	1859.50	1591.20	1415.62	1663.97	2362.44	2771.38	3406.82
2	oil	1.5% 1.97%	248.80	232.00	221.20	194.40	154.40	142.40	152.00
3	tyre	14.1% 9.9%	238.41	330.10	664.79	974.17	1505.82	2372.33	5383.84
4	maint lbr	4.5% 4.9%	482.80	482.80	482.80	482.80	482.80	482.80	482.80
5	maint prts	22.9% 24.8%	2450.66	2450.66	2450.66	2450.66	2450.66	2450.66	2450.66
6	dep	14.8% 16.8%	2111.74	1908.78	1766.17	1658.34	1580.96	1516.22	1460.93
7	int	7.5% 8.95%	1371.12	1144.89	993.76	884.45	796.80	728.15	672.65
8	time	12.9% 15.88%	3136.67	2352.50	1882.00	1568.33	1344.29	1176.25	1045.56
Total			11899.70	10492.93	9877.00	9877.12	10678.16	11640.19	15055.26

(iii) ECONOMIC COSTS

1	fuel		1470.59	1258.40	1119.54	1315.95	1868.34	2191.75	2694.28
2	oil		186.60	174.00	165.90	145.80	115.80	106.80	114.00
3	tyre		123.08	170.42	343.22	502.94	777.42	1224.78	2779.55
4	maint lbr		482.80	482.80	482.80	482.80	482.80	482.80	482.80
5	maint prts		1887.72	1887.72	1887.72	1887.72	1887.72	1887.72	1887.72
6	dep		1626.65	1470.31	1360.46	1277.41	1217.79	1167.93	1125.34
7	int		1056.16	881.90	765.49	681.28	613.77	560.89	518.14
8	time		3136.67	2352.50	1882.00	1568.33	1344.29	1176.25	1045.56
Total			9970.28	8678.06	8007.13	7862.23	8307.93	8798.91	10647.39

Required for:

- Project appraisal

- fixation of fares

VEHICLE OPERATING COSTS (Rs./1000 Km.)

SNo	Variables	Unit	B U S - Kilometer per hour						
			30	40	50	60	70	80	90
F. GRAVEL ROADS									
(i) QUANTITIES									
1	fuel	litres	307.11	263.27	234.58	275.16	389.29	456.11	559.94
2	oil	litres	6.22	5.8	5.53	4.86	3.86	3.56	3.8
3	tyre	unit	0.045	0.064	0.1305	0.1909	0.2898	0.45936	1.02896
4	maint lbr	hrs	28.72	28.72	28.72	28.72	28.72	28.72	28.72
5	maint prts	veh	0.00434	0.00434	0.00434	0.00434	0.00434	0.00434	0.00434
6	dep	veh	0.002292	0.002071	0.001917	0.0018	0.001716	0.001645	0.001585
7	int	veh	0.001488	0.001242	0.001078	0.00096	0.000864	0.000790	0.000730
8	time	hrs	33.33	25.00	20.00	16.67	14.29	12.50	11.11
(ii) FINCNCIAL COSTS									
1	fuel		1879.51	1611.21	1435.63	1683.98	2382.45	2791.39	3426.83
2	oil		248.80	232.00	221.20	194.40	154.40	142.40	152.00
3	tyre		275.09	391.23	797.75	1166.97	1771.55	2808.07	6290.03
4	maint lbr		574.40	574.40	574.40	574.40	574.40	574.40	574.40
5	maint prts		3998.45	3998.45	3998.45	3998.45	3998.45	3998.45	3998.45
6	dep		2111.74	1908.78	1766.17	1658.34	1580.96	1516.22	1460.93
7	int		1371.12	1144.89	993.76	884.45	796.80	728.15	672.65
8	time		3136.67	2352.50	1882.00	1568.33	1344.29	1176.25	1045.56
	Total		13595.78	12213.46	11669.36	11729.33	12603.30	13735.33	17620.85
(iii) ECONOMIC COSTS									
1	fuel		1486.41	1274.23	1135.37	1331.77	1884.16	2207.57	2710.11
2	oil		186.60	174.00	165.90	145.80	115.80	106.80	114.00
3	tyre		142.02	201.98	411.86	602.48	914.61	1449.74	3247.40
4	maint lbr		574.40	574.40	574.40	574.40	574.40	574.40	574.40
5	maint prts		3079.97	3079.97	3079.97	3079.97	3079.97	3079.97	3079.97
6	dep		1626.65	1470.31	1360.46	1277.41	1217.79	1167.93	1125.34
7	int		1056.16	881.90	765.49	681.28	613.77	560.89	518.14
8	time		3136.67	2352.50	1882.00	1568.33	1344.29	1176.25	1045.56
	Total		11288.89	10009.29	9375.44	9261.45	9744.79	10323.54	12414.91

VI

TRUCKS

VEHICLE OPERATING COSTS (Rs./1000 Km.)

SNo	Variables	Unit	T R U C K - Kilometer per hour					
			30	40	50	60	70	80
A. VARIABLES								
1	fuel consumpt	ltrs	394	253	226	196	226	293
2	Add for	10	49.29	49.29	49.29	49.29	49.29	49.29
	rate of	20	98.58	98.58	98.58	98.58	98.58	98.58
	rise	30	147.87	147.87	147.87	147.87	147.87	147.87
		40	197.16	197.16	197.16	197.16	197.16	197.16
		50	246.45	246.45	246.45	246.45	246.45	246.45
		60	195.74	195.74	195.74	195.74	195.74	195.74
		70	345.03	345.03	345.03	345.03	345.03	345.03
		80	394.33	394.33	394.33	394.33	394.33	394.33
		90	418.97	418.97	418.97	418.97	418.97	418.97
3	deduct for	10	20.72	20.72	20.72	20.72	20.72	20.72
	rate of	20	41.45	41.45	41.45	41.45	41.45	41.45
	fall	30	62.17	62.17	62.17	62.17	62.17	62.17
		40	82.9	82.9	82.9	82.9	82.9	82.9
		50	103.62	103.62	103.62	103.62	103.62	103.62
		60	124.34	124.34	124.34	124.34	124.34	124.34
		70	145.07	145.07	145.07	145.07	145.07	145.07
		80	165.79	165.79	165.79	165.79	165.79	165.79
		90	176.76	176.76	176.76	176.76	176.76	176.76
4	% increase	10				1	2	4
	for deg.	20	1	1	1	2	5	10
	curvature	30	1	1	2	6	14	28
		40	1	1	4	12	33	
		50	1	2	8	20	51	
		60	1	2	14	37		
		70	1	10	25	46		
		80	5	15	38			
		90	6	21	73			
5	add for	1.5	2.46	2.46	2.46	2.46	2.46	2.46
	roughness	2.0	3.28	3.28	3.28	3.28	3.28	3.28
		2.5	4.10	4.10	4.10	4.10	4.10	4.10
		3.0	4.92	4.92	4.92	4.92	4.92	4.92
		3.5	5.74	5.74	5.74	5.74	5.74	5.74
		4.0	6.55	6.55	6.55	6.55	6.55	6.55
		4.5	7.37	7.37	7.37	7.37	7.37	7.37
		5.0	8.19	8.19	8.19	8.19	8.19	8.19
		5.5	9.01	9.01	9.01	9.01	9.01	9.01
		6.0	9.83	9.83	9.83	9.83	9.83	9.83
		6.5	10.65	10.65	10.65	10.65	10.65	10.65
		7.0	11.47	11.47	11.47	11.47	11.47	11.47
		7.5	12.29	12.29	12.29	12.29	12.29	12.29
6	% increase	40				6	17	35
	for cong.	50				6	16	33
	operating	60					10	26
	sped	70					4	18
		80						9
		88						

VEHICLE OPERATING COSTS (Rs./1000 Km.)

SNo	Variables	Unit	T R U C K - Kilometer per hour					
			30	40	50	60	70	80
7	add ltrs to	stop	0.08	0.11	0.14	0.20	0.25	0.28
	for speed	10	0.06	0.10	0.13	0.18	0.23	0.27
	reduced to	20	0.04	0.07	0.10	0.16	0.21	0.24
	& returned	30		0.03	0.07	0.13	0.18	0.21
	from	40			0.04	0.10	0.16	0.19
		50				0.07	0.14	0.17
		60					0.09	0.13
		70						0.07
		80						
8	Engine oil	ltrs	6.22	5.8	5.53	4.86	3.86	3.56
9	tyre wear	1.50	0.03	0.04	0.06	0.08	0.10	0.12
	for	2.00	0.03	0.05	0.06	0.08	0.10	0.13
	roughness	2.50	0.04	0.05	0.07	0.09	0.11	0.13
		3.00	0.04	0.05	0.07	0.09	0.11	0.14
		3.50	0.04	0.05	0.08	0.10	0.12	0.15
		4.00	0.04	0.06	0.08	0.10	0.13	0.15
		4.50	0.04	0.06	0.08	0.11	0.13	0.16
		5.00	0.04	0.06	0.09	0.11	0.14	0.17
		5.50	0.05	0.06	0.09	0.12	0.14	0.17
		6.00	0.05	0.07	0.09	0.12	0.15	0.18
	6.50	0.05	0.07	0.10	0.12	0.15	0.19	
	7.00	0.05	0.07	0.10	0.13	0.16	0.19	
	7.50	0.05	0.07	0.10	0.13	0.16	0.20	
10	% increase	100			27	38	49	70
	due to	200			45	66	107	150
	curvature	300			68	113	185	280
	(deg. per km)	400		10	118	197	282	440
		500	10	40	188	291	428	730
		600	28	80	270	413	710	
		700	47	120	423	638		
		800	75	180	663			
	900	141	280					
11	% increase	40	23	72	111	158		
	due to	50		42	71	109		
	congestion	60		21	45	73		
	op spd	70			15	35		
		80				14		

VEHICLE OPERATING COSTS (Rs./1000 Km.)

SNo	Variables	Unit	TRUCK - Kilometer per hour					
			30	40	50	60	70	80
12	labour	1.0	18.65	18.65	18.65	18.65	18.65	18.65
	hours	1.5	19.74	19.74	19.74	19.74	19.74	19.74
	for	2.0	20.82	20.82	20.82	20.82	20.82	20.82
	roughness	2.5	21.92	21.92	21.92	21.92	21.92	21.92
		3.0	23.00	23.00	23.00	23.00	23.00	23.00
		3.5	24.09	24.09	24.09	24.09	24.09	24.09
		4.0	25.18	25.18	25.18	25.18	25.18	25.18
		4.5	26.27	26.27	26.27	26.27	26.27	26.27
		5.0	27.35	27.35	27.35	27.35	27.35	27.35
		5.5	28.44	28.44	28.44	28.44	28.44	28.44
		6.0	29.53	29.53	29.53	29.53	29.53	29.53
		6.5	30.62	30.62	30.62	30.62	30.62	30.62
		7.0	31.70	31.70	31.70	31.70	31.70	31.70
		7.5	32.79	32.79	32.79	32.79	32.79	32.79
13	maint parts	1.0	0.0491	0.0491	0.0491	0.0491	0.0491	0.0491
	% of new veh	1.5	0.1941	0.1941	0.1941	0.1941	0.1941	0.1941
	price for	2.0	0.1392	0.1392	0.1392	0.1392	0.1392	0.1392
	roughness	2.5	0.1843	0.1843	0.1843	0.1843	0.1843	0.1843
	meters/km	3.0	0.2280	0.2280	0.2280	0.2280	0.2280	0.2280
		3.5	0.2745	0.2745	0.2745	0.2745	0.2745	0.2745
		4.0	0.3196	0.3196	0.3196	0.3196	0.3196	0.3196
		4.5	0.3647	0.3647	0.3647	0.3647	0.3647	0.3647
		5.0	0.4098	0.4098	0.4098	0.4098	0.4098	0.4098
		5.5	0.4458	0.4458	0.4458	0.4458	0.4458	0.4458
		6.0	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000
		6.5	0.5450	0.5450	0.5450	0.5450	0.5450	0.5450
		7.0	0.5901	0.5901	0.5901	0.5901	0.5901	0.5901
		7.5	0.6352	0.6352	0.6352	0.6352	0.6352	0.6352
14	dep. vehprice		0.0016	0.0015	0.0014	0.0013	0.0012	0.0012
15	int vehprice/2		0.0013	0.0011	0.0010	0.0009	0.0008	0.0007
16	time	hrs	33.3	25.0	20.0	16.7	14.3	12.5
17	value	rs/hrs	27.50	27.50	27.50	27.50	27.50	27.50

B MARKET PRICES

1	fuel	litres	6.12	6.12	6.12	6.12	6.12	6.12
2	oil	litres	40.00	40.00	40.00	40.00	40.00	40.00
3	tyre	unit	5730	5730	5730	5730	5730	5730
4	maint lbr	rs/hr	20.00	20.00	20.00	20.00	20.00	20.00
5	vehicle	rs	626529	626529	626529	626529	626529	626529
6	time	hrs	27.50	27.50	27.50	27.50	27.50	27.50

C FACTOR COSTS

1	fuel	litres	4.84	4.84	4.84	4.84	4.84	4.84
2	oil	litres	30.00	30.00	30.00	30.00	30.00	30.00
3	tyre	unit	3242	3242	3242	3242	3242	3242
4	maint lbr	rs/hr	20	20	20	20	20	20
5	vehicle	rs	412302	412302	412302	412302	412302	412302
6	time	hrs	27.50	27.50	27.50	27.50	27.50	27.50

VEHICLE OPERATING COSTS (Rs./1000 Km.)

SNo	Variables	Unit	T R U C K - Kilometer per hour					
			30	40	50	60	70	80
D. IMPROVED ROADS								
(i) QUANTITIES								
1	fuel	litres	426.63	286.23	259.83	232.99	266.55	367.72
2	oil	litres	6.22	5.8	5.53	4.86	3.86	3.56
3	tyre	unit	0.031	0.044	0.07747	0.11856	0.14453	0.204
4	maint lbr	hrs	19.74	19.74	19.74	19.74	19.74	19.74
5	maint prts	veh	0.001941	0.001941	0.001941	0.001941	0.001941	0.001941
6	dep	veh	0.001637	0.001479	0.001369	0.001285	0.001225	0.001175
7	int	veh	0.001328	0.001109	0.000963	0.000857	0.000772	0.000705
8	time	hrs	33.33	25.00	20.00	16.67	14.29	12.50
(ii) FINANCIAL COSTS								
1	fuel	23.0%	2610.98	1751.73	1590.16	1425.90	1631.29	2250.45
2	oil	2.2%	248.80	232.00	221.20	194.40	154.40	142.40
3	tyre	12.6%	189.50	268.97	473.57	724.76	883.51	1247.05
4	maint lbr	5.6%	394.80	394.80	394.80	394.80	394.80	394.80
5	maint prts	25.2%	1788.25	1788.25	1788.25	1788.25	1788.25	1788.25
6	dep	15.9%	1508.39	1363.41	1261.55	1184.53	1129.25	1083.01
7	int	10.0%	1224.22	1022.22	887.29	789.69	711.43	650.13
8	time	5.5%	916.67	687.50	550.00	458.33	392.86	343.75
	Total	1780	8881.60	7508.88	7166.82	6960.66	7085.79	7899.84
(iii) ECONOMIC COSTS								
1	fuel		2064.89	1385.35	1257.58	1127.67	1290.10	1779.76
2	oil		186.60	174.00	165.90	145.80	115.80	106.80
3	tyre		97.84	138.86	244.50	374.18	456.14	643.82
4	maint lbr		394.80	394.80	394.80	394.80	394.80	394.80
5	maint prts		1406.72	1406.72	1406.72	1406.72	1406.72	1406.72
6	dep		1186.57	1072.52	992.39	931.81	888.32	851.95
7	int		963.03	804.13	697.98	621.20	559.64	511.42
8	time		916.67	687.50	550.00	458.33	392.86	343.75
	Total		7217.10	6063.89	5709.87	5460.51	5504.38	6039.03

VEHICLE OPERATING COSTS (Rs./1000 Km.)

SNo	Variables	Unit	TRUCK - Kilometer per hour				
			30	40	50	60	70

E. UN-IMPROVED ROADS

(i) QUANTITIES								
1	fuel	litres	462.41	320.6	293.93	266.79	305.17	417.14
2	oil	litres	6.22	5.8	5.53	4.86	3.86	3.56
3	tyre	unit	0.039	0.054	0.10875	0.1728	0.24633	0.3675
4	maint lbr	hrs	24.09	24.09	24.09	24.09	24.09	24.09
5	maint prts	veh	0.002745	0.002745	0.002745	0.002745	0.002745	0.002745
6	dep	veh	0.001637	0.001479	0.001369	0.001285	0.001225	0.001175
7	int	veh	0.001328	0.001109	0.000963	0.000857	0.000772	0.000705
8	time	hrs	33.33	25.00	20.00	16.67	14.29	12.50
(ii) FINCNIAL COSTS								
1	fuel		2829.95	1962.07	1798.85	1632.75	1867.64	2552.90
2	oil		248.80	232.00	221.20	194.40	154.40	142.40
3	tyre		238.41	330.10	664.79	1056.33	1505.82	2246.53
4	maint lbr		481.80	481.80	481.80	481.80	481.80	481.80
5	maint prts		2528.97	2528.97	2528.97	2528.97	2528.97	2528.97
6	dep		1508.39	1363.41	1261.55	1184.53	1129.25	1083.01
7	int		1224.22	1022.22	887.29	789.69	711.43	650.13
8	time		916.67	687.50	550.00	458.33	392.86	343.75
	Total		9977.20	8608.08	8394.45	8326.81	8772.17	10029.49
(iii) ECONOMIC COSTS								
1	fuel		2238.06	1551.70	1422.62	1291.26	1477.02	2018.96
2	oil		186.60	174.00	165.90	145.80	115.80	106.80
3	tyre		123.08	170.42	343.22	545.36	777.42	1159.83
4	maint lbr		481.80	481.80	481.80	481.80	481.80	481.80
5	maint prts		1989.41	1989.41	1989.41	1989.41	1989.41	1989.41
6	dep		1186.57	1072.52	992.39	931.81	888.32	851.95
7	int		963.03	804.13	697.98	621.20	559.64	511.42
8	time		916.67	687.50	550.00	458.33	392.86	343.75
	Total		8085.22	6931.49	6643.32	6464.97	6682.27	7463.92

VEHICLE OPERATING COSTS (Rs./1000 Km.)

SNo	Variables	Unit	T R U C K - Kilometer per hour					
			30	40	50	60	70	80
F. GRAVEL ROADS								
(i) QUANTITIES								
1	fuel	litres	465.68	323.87	297.2	270.06	308.44	420.41
2	oil	litres	6.22	5.8	5.53	4.86	3.86	3.56
3	tyre	unit	0.045	0.064	0.1305	0.207	0.2898	0.435
4	maint lbr	hrs	28.44	28.44	28.44	28.44	28.44	28.44
5	maint prts	veh	0.004458	0.004458	0.004458	0.004458	0.004458	0.004458
6	dep	veh	0.001637	0.001479	0.001369	0.001285	0.001225	0.001175
7	int	veh	0.001328	0.001109	0.000963	0.000857	0.000772	0.000705
8	time	hrs	33.33	25.00	20.00	16.67	14.29	12.50
(ii) FINCNIAL COSTS								
1	fuel		2849.96	1982.08	1818.86	1652.77	1887.65	2572.91
2	oil		248.80	232.00	221.20	194.40	154.40	142.40
3	tyre		275.09	391.23	797.75	1265.39	1771.55	2659.16
4	maint lbr		568.80	568.80	568.80	568.80	568.80	568.80
5	maint prts		4107.16	4107.16	4107.16	4107.16	4107.16	4107.16
6	dep		1508.39	1363.41	1261.55	1184.53	1129.25	1083.01
7	int		1224.22	1022.22	887.29	789.69	711.43	650.13
8	time		916.67	687.50	550.00	458.33	392.86	343.75
	Total		11699.08	10354.42	10212.61	10221.07	10723.11	12127.32
(iii) ECONOMIC COSTS								
1	fuel		2253.89	1567.53	1438.45	1307.09	1492.85	2034.78
2	oil		186.60	174.00	165.90	145.80	115.80	106.80
3	tyre		142.02	201.98	411.86	653.29	914.61	1372.86
4	maint lbr		568.80	568.80	568.80	568.80	568.80	568.80
5	maint prts		3230.89	3230.89	3230.89	3230.89	3230.89	3230.89
6	dep		1186.57	1072.52	992.39	931.81	888.32	851.95
7	int		963.03	804.13	697.98	621.20	559.64	511.42
8	time		916.67	687.50	550.00	458.33	392.86	343.75
	Total		9448.46	8307.35	8056.27	7917.21	8163.77	9021.25