

CALCULATED OVERLAY THICKNESS (36)

RH - 28 (2175 - 0100) (2)

Section (Km.)-(Km.)	Average Deflection $\bar{X}$ (m.m.)	Standard Deviation $\sigma$ (m.m.)	Design Deflection $\bar{X}+1.5\sigma$ (m.m.)	Roughness ( $10^3$ mm/Km.)					Overlay Thickness (mm)					Remarks.		
				0	2	4	6	8	10	A1	A2	B	C		D	E
30 - 31	0.6148	0.1186	0.7927							0	0	*	*	0	0	Note; A1; Asphalt Institute Method (Design Def. $\bar{X} + 1.5\sigma$ ) A2; Asphalt Institute Method (Design Def. $\bar{X} + 2.0\sigma$ ) B; TRRL Method C; TRRL in the Tropics Method D; Ruiz's Formula E; California Method  * Pavement failure within design period is not foreseen.
31 - 32	0.7790	0.1485	1.0018							0	0	*	0	0	0	
32 - 33	0.9310	0.1241	1.1170							0	0	*	3	5	10	
33 - 34	0.7844	0.2003	1.0848							0	0	*	0	0	7	

Appendix 8.9 CONSTRUCTION QUANTITIES AND COSTS (overlay) (1)

Appendix 8.9

1 of 6

Items	Unit of Q'ty	Financial Unit Rate (₪)	Route Number								
			RH-1 (28 Km)			RH-2 (10 Km)			RH-3 (46 Km)		
			Q'ty	Financial Cost (10 <sup>3</sup> ₪)	Economic Cost (10 <sup>3</sup> ₪)	Q'ty	Financial Cost (10 <sup>3</sup> ₪)	Economic Cost (10 <sup>3</sup> ₪)	Q'ty	Financial Cost (10 <sup>3</sup> ₪)	Economic Cost (10 <sup>3</sup> ₪)
<b>DIRECT CONSTRUCTION COST</b>											
Soil Aggregate Shoulder	m <sup>3</sup>	105	-	-	-	-	-	-	-	-	-
Tack Coat	m <sup>2</sup>	10	182,000	1,820	1,674	60,000	600	552	276,000	2,760	2,539
Asphalt Concrete	m <sup>2</sup>	t= 40√120mm 88√264	t= 40mm 182,000	15,840	14,256	t= 40mm 60,000	5,280	4,752	t= 40mm 276,000	24,310	21,879
Subtotal (a)				17,660	15,930		5,880	5,304		27,070	24,418
Miscellaneous Works (a) x 3.5%				618	558		206	186		947	855
Total (b)				18,278	16,488		6,086	5,490		28,017	25,273
PHYSICAL CONTINGENCY (b) x 15%				2,742	2,473		913	823		4,203	3,791
ENGINEERING AND ADMINISTRATION (b) x 8%				1,462	1,319		487	439		2,241	2,022
Subtotal				4,204	3,792		1,400	1,263		6,444	5,813
GRAND TOTAL				22,482	20,280		7,486	6,752		34,461	31,086

Items	Unit of Q'ty	Financial Unit Rate (₪)	Route Number								
			RH-4 (9 Km)			RH-5 (23 Km)			RH-6 (25 Km)		
			Q'ty	Financial Cost (10 <sup>3</sup> ₪)	Economic Cost (10 <sup>3</sup> ₪)	Q'ty	Financial Cost (10 <sup>3</sup> ₪)	Economic Cost (10 <sup>3</sup> ₪)	Q'ty	Financial Cost (10 <sup>3</sup> ₪)	Economic Cost (10 <sup>3</sup> ₪)
<b>DIRECT CONSTRUCTION COST</b>											
Soil Aggregate Shoulder	m <sup>3</sup>	105	-	-	-	-	-	-	-	-	-
Tack Coat	m <sup>2</sup>	10	54,000	540	497	138,000	1,380	1,270	150,000	1,500	1,380
Asphalt Concrete	m <sup>2</sup>	t= 40√120mm 88√264	t= 40mm 54,000	4,840	4,356	t= 40mm 138,000	12,210	10,989	t= 40mm 150,000	13,200	11,880
Subtotal				5,380	4,853		13,590	12,259		14,700	13,260
Miscellaneous Works (a) x 3.5%				188	170		476	429		515	464
Total (b)				5,568	5,023		14,066	12,688		15,215	13,724
PHYSICAL CONTINGENCY (b) x 15%				835	753		2,110	1,903		2,282	2,059
ENGINEERING AND ADMINISTRATION (b) x 8%				445	402		1,125	1,015		1,217	1,098
Subtotal				1,281	1,155		3,235	2,918		3,499	3,157
GRAND TOTAL				6,849	6,178		17,301	15,606		18,714	16,881

## CONSTRUCTION QUANTITIES AND COSTS (Overlay) (2)

Items	Unit of Q'ty	Financial Unit Rate (₪)	Route Number								
			RH-9 (7 Km)			RH-12 (6 Km)			RH-15 (44 Km)		
			Q'ty	Financial Cost (10 <sup>3</sup> ₪)	Economic Cost (10 <sup>3</sup> ₪)	Q'ty	Financial Cost (10 <sup>3</sup> ₪)	Economic Cost (10 <sup>3</sup> ₪)	Q'ty	Financial Cost (10 <sup>3</sup> ₪)	Economic Cost (10 <sup>3</sup> ₪)
DIRECT CONSTRUCTION COST											
Soil Aggregate Shoulder	m <sup>3</sup>	105	-	-	-	-	-	-	-	-	-
Tack Coat	m <sup>2</sup>	10	42,000	420	386	36,000	360	331	264,000	2,640	2,429
Asphalt Concrete	m <sup>2</sup>	t=40~120mm 88~264	t=40mm 42,000	3,740	3,366	t=40mm 36,000	3,190	2,871	t=40mm 264,000	23,320	20,988
Subtotal (a)				4,160	3,752		3,550	3,202		25,960	23,417
Miscellaneous Works (a) x 3.5%				146	131		124	112		909	820
Total (b)				4,306	3,884		3,674	3,314		26,869	24,236
PHYSICAL CONTINGENCY (b) x 15%				646	583		551	497		4,030	3,635
ENGINEERING AND ADMINISTRATION (b) x 8%				344	311		294	265		2,149	1,
Subtotal				990	893		845	762		6,180	5,574
GRAND TOTAL				5,296	4,777		4,519	4,077		33,048	29,811

Items	Unit of Q'ty	Financial Unit Rate (₪)	Route Number								
			RH-16 (1.4 Km)			RH-17 (9 Km)			RH-18 (30 Km)		
			Q'ty	Financial Cost (10 <sup>3</sup> ₪)	Economic Cost (10 <sup>3</sup> ₪)	Q'ty	Financial Cost (10 <sup>3</sup> ₪)	Economic Cost (10 <sup>3</sup> ₪)	Q'ty	Financial Cost (10 <sup>3</sup> ₪)	Economic Cost (10 <sup>3</sup> ₪)
DIRECT CONSTRUCTION COST											
Soil Aggregate Shoulder	m <sup>3</sup>	105	-	-	-	-	-	-	-	-	-
Tack Coat	m <sup>2</sup>	10	84,000	840	773	54,000	540	497	180,000	1,800	1,656
Asphalt Concrete	m <sup>2</sup>	t=40~120 88~264	t=40mm 84,000	8,030	7,227	t=40mm 54,000	4,840	4,356	t=40mm 180,000	15,840	14,256
Subtotal				8,870	8,000		5,380	4,853		17,640	15,912
Miscellaneous Works (a) x 3.5%				310	280		188	170		617	557
Total (b)				9,180	8,280		5,568	5,023		18,257	16,469
PHYSICAL CONTINGENCY (b) x 15%				1,377	1,242		835	753		2,739	2,470
ENGINEERING AND ADMINISTRATION (b) x 8%				734	662		445	402		1,461	1,318
Subtotal				2,112	1,904		1,281	1,155		4,199	3,788
GRAND TOTAL				11,292	10,184		6,849	6,178		22,457	20,257

## CONSTRUCTION QUANTITIES AND COSTS (Overlay) (3)

Items	Unit of Q'ty	Financial Unit Rate (₪)	Route Number								
			RH-20 (6 Km)			RH-21 (13 Km)			RH-22 (8 Km)		
			Q'ty	Financial Cost (10 <sup>3</sup> ₪)	Economic Cost (10 <sup>3</sup> ₪)	Q'ty	Financial Cost (10 <sup>3</sup> ₪)	Economic Cost (10 <sup>3</sup> ₪)	Q'ty	Financial Cost (10 <sup>3</sup> ₪)	Economic Cost (10 <sup>3</sup> ₪)
DIRECT CONSTRUCTION COST											
Soil Aggregate Shoulder	m <sup>3</sup>	105	-	305	271	-	-	-	-	-	-
Tack Coat	m <sup>2</sup>	10	84,000	840	773	91,000	910	837	40,000	400	363
Asphalt Concrete	m <sup>2</sup>	t=40~120mm 88~264	t=120mm 42,000	11,220	10,098	t=30mm 91,000	10,010	9,009	t=40mm 40,000	3,520	3,168
Subtotal (a)			-	12,365	11,142		10,920	9,846		3,920	3,536
Miscellaneous Works (a) x 3.5%				433	390		382	345		137	124
Total (b)				12,797	11,532		11,302	10,191		4,057	3,660
PHYSICAL CONTINGENCY (b) x 15%				1,920	1,730		1,695	1,529		609	549
ENGINEERING AND ADMINISTRATION (b) x 8%				1,024	923		904	815		325	293
Subtotal				2,943	2,652		2,600	2,344		933	842
GRAND TOTAL				15,741	14,184		13,902	12,535		4,990	4,502

Items	Unit of Q'ty	Financial Unit Rate (₪)	Route Number								
			RH-23 (16 Km)			RH-24 (16 Km)			RH-27 (16 Km)		
			Q'ty	Financial Cost (10 <sup>3</sup> ₪)	Economic Cost (10 <sup>3</sup> ₪)	Q'ty	Financial Cost (10 <sup>3</sup> ₪)	Economic Cost (10 <sup>3</sup> ₪)	Q'ty	Financial Cost (10 <sup>3</sup> ₪)	Economic Cost (10 <sup>3</sup> ₪)
DIRECT CONSTRUCTION COST											
Soil Aggregate Shoulder	m <sup>3</sup>	105		273	243		336	299	-	-	-
Tack Coat	m <sup>2</sup>	10	182,000	1,920	1,766	182,000	1,920	1,766	80,000	800	736
Asphalt Concrete	m <sup>2</sup>	t=40~120mm 88~264	t=80mm 96,000	16,940	15,246	t=100mm 96,000	21,120	19,008	t=40mm 80,000	7,040	6,336
Subtotal				19,133	17,255		23,376	21,073		7,840	7,072
Miscellaneous Works (a) x 3.5%				670	604		818	738		274	248
Total (b)				19,803	17,859		24,194	21,811		8,114	7,320
PHYSICAL CONTINGENCY (b) x 15%				2,970	2,679		3,629	3,272		1,217	1,098
ENGINEERING AND ADMINISTRATION (b) x 8%				1,584	1,429		1,936	1,745		649	586
Subtotal				4,555	4,108		5,565	5,017		1,866	1,683
GRAND TOTAL				24,357	21,967		29,759	26,828		9,981	9,003

CONSTRUCTION QUANTITIES AND COSTS (Overlay) (4)

Items	Unit of Q'ty	Financial Unit Rate (₪)	Route Number		
			RH-28 (18 Km)		
			Q'ty	Financial Cost (10 <sup>3</sup> ₪)	Economic Cost (10 <sup>3</sup> ₪)
DIRECT CONSTRUCTION COST					
Soil Aggregate Shoulder	m <sup>3</sup>	105	-	-	-
Tack Coat	m <sup>2</sup>	10	99,000	990	991
Asphalt Concrete	m <sup>2</sup>	t=40v120mm 88v264	t=40mm 99,000	8,800	7,920
Subtotal (a)			-	9,790	8,831
Miscellaneous Works (a) x 3.5%				343	309
Total (b)				10,133	9,140
PHYSICAL CONTINGENCY (b) x 15%				1,520	1,371
ENGINEERING AND ADMINISTRATION (b) x 8%				811	731
Subtotal				2,331	2,102
GRAND TOTAL				12,463	11,242

## CONSTRUCTION QUANTITIES AND COSTS (Reconstruction) (5)

Items	Unit of Q'ty	Financial Unit Rate (₪)	Route Number								
			RH-10 (5.0 km) AC=5 cm, C=15 cm	RH-13 (24 Km) A=5 cm, C=25 cm.		RH-14 (27 Km) t=5 cm, C=23 cm.					
			Q'ty	Financial Cost (10 <sup>3</sup> ₪)	Economic Cost (10 <sup>3</sup> ₪)	Q'ty	Financial Cost (10 <sup>3</sup> ₪)	Economic Cost (10 <sup>3</sup> ₪)	Q'ty	Financial Cost (10 <sup>3</sup> ₪)	Economic Cost (10 <sup>3</sup> ₪)
DIRECT CONSTRUCTION COST											
Clearing and Grubbing	ha	15,600	-	-	-	48	720	655	54	810	737
Embankment	m <sup>3</sup>	45	-	-	-	62,400	2,808	2,555	70,200	3,159	2,875
Scarifying (A.C)	m <sup>2</sup>	20	30,000	600	540	-	-	-	-	-	-
Scarifying (D.B.S.T)	m <sup>2</sup>	7	-	-	-	120,000	840	756	135,000	945	851
Soil Aggregate Subbase	m <sup>3</sup>	105	-	-	-	19,200	2,016	1,794	21,600	2,268	2,019
Crushed Stone Base	m <sup>3</sup>	370	5,300	1,961	1,804	46,700	17,279	15,897	50,000	18,500	17,020
Soil Aggregate Shoulder	m <sup>3</sup>	105	2,600	273	243	37,300	3,917	3,486	39,800	4,179	3,719
Tack Coat	m <sup>2</sup>	10	30,000	300	270	144,000	1,440	1,296	162,000	1,620	1,458
Asphalt Concrete	m <sup>2</sup>	t = 50 mm 110	30,000	3,300	2,970	144,000	15,840	14,256	162,000	17,820	16,038
Subtotal (a)				6,434	5,827		44,860	40,677		49,301	44,717
Miscellaneous Works (a) x 7%				450	408		3,140	2,847		3,451	3,130
Total (b)				6,884	6,235		48,000	43,524		52,752	47,847
PHYSICAL CONTINGENCY (b) x 15%				1,033	935		7,200	6,529		7,913	7,177
ENGINEERING AND ADMINISTRATION (b) x 10%				688	624		4,800	4,352		5,275	4,785
Subtotal				1,721	1,559		12,000	10,881		13,188	11,962
GRAND TOTAL				8,605	7,794		60,000	54,405		65,940	59,809

## CONSTRUCTION QUANTITIES AND COSTS (Reconstruction) (6)

Items	Unit of Q'ty	Financial Unit Rate (₪)	Route Number					
			RH-19 Q'ty	(46 Km) AC=5 cm, C=30 cm Financial Cost (10 <sup>3</sup> ₪)	Economic Cost (10 <sup>3</sup> ₪)	RH-26 Q'ty	(22 Km) AC=5 cm, C=24 cm Financial Cost (10 <sup>3</sup> ₪)	Economic Cost (10 <sup>3</sup> ₪)
DIRECT CONSTRUCTION COST								
Clearing and Grubbing	ha	15,000	-	-	-	-	-	-
Embankment	m <sup>3</sup>	45	-	-	-	-	-	-
Scarifying (A.C)	m <sup>2</sup>	20	140,000	2,800	2,520	-	-	-
Scarifying (D.B.S.T)	m <sup>2</sup>	7	-	-	-	132,000	924	832
Soil Aggregate Subbase	m <sup>3</sup>	105	-	-	-	-	-	-
Crushed Stone Base	m <sup>3</sup>	370	48,000	17,760	16,339	36,900	13,653	12,561
Soil Aggregate Shoulder	m <sup>3</sup>	105	20,700	2,174	1,935	11,800	1,239	1,102
Tack Coat	m <sup>2</sup>	t = 10	182,000	1,820	2,898	132,000	1,320	1,188
Asphalt Concrete	m <sup>2</sup>	50 mm 110	322,000	35,420	31,878	132,000	14,520	13,068
Subtotal (a)				61,374	55,570		31,656	28,751
Miscellaneous Works (a) x 7%				4,296	3,890		2,216	2,013
Total (b)				65,690	59,460		33,872	30,764
PHYSICAL CONTINGENCY (b) x 15%				9,850	8,919		5,081	4,615
ENGINEERING AND ADMINISTRATION (b) x 10%				6,567	5,946		3,387	3,076
Subtotal				16,417	14,865		8,468	7,691
GRAND TOTAL				82,087	74,325		42,340	38,445

PROPOSED LINK NO. RH - 1

YEAR	COST	VOC SAVING	DISCOUNTED(12%)	
			COST	BENEFIT
1983	20,280	4,120	20,280	3,678
1984	0	4,322	0	3,446
1985	0	4,525	0	3,221
1986	0	4,728	0	3,005
1987	0	4,931	0	2,798
1988	0	5,133	0	2,601
1989	0	5,336	0	2,414
TOTAL	20,280	33,094	20,280	21,161

DISCOUNTED ECONOMIC COSTS : 20,280  
DISCOUNTED ECONOMIC BENEFITS : 21,161  
NET PRESENT VALUE : 881  
BENEFIT COST RATIO : 1.04  
INTERNAL RATE OF RETURN : 13.3 %

PROPOSED LINK NO. RH - 2

YEAR	COST	VOC SAVING	DISCOUNTED(12%)	
			COST	BENEFIT
1983	6,752	5,981	6,752	5,341
1984	0	6,267	0	4,996
1985	0	6,553	0	4,664
1986	0	6,838	0	4,346
1987	0	7,124	0	4,042
1988	0	7,410	0	3,754
1989	0	7,695	0	3,481
TOTAL	6,752	47,869	6,752	30,624

DISCOUNTED ECONOMIC COSTS : 6,752  
DISCOUNTED ECONOMIC BENEFITS : 30,624  
NET PRESENT VALUE : 23,872  
BENEFIT COST RATIO : 4.54  
INTERNAL RATE OF RETURN : 91.9 %

PROPOSED LINK NO. RH - 3

YEAR	COST	VOC SAVING	DISCOUNTED(12%)	
			COST	BENEFIT
1983	31,086	5,870	31,086	5,241
1984	0	6,148	0	4,901
1985	0	6,426	0	4,574
1986	0	6,704	0	4,261
1987	0	6,982	0	3,962
1988	0	7,260	0	3,678
1989	0	7,538	0	3,410
TOTAL	31,086	46,928	31,086	30,027

DISCOUNTED ECONOMIC COSTS : 31,086  
DISCOUNTED ECONOMIC BENEFITS : 30,027  
NET PRESENT VALUE : -1,059  
BENEFIT COST RATIO : 0.97  
INTERNAL RATE OF RETURN : 11.0 %

PROPOSED LINK NO. RH - 4

YEAR	COST	VOC SAVING	DISCOUNTED(12%)	
			COST	BENEFIT
1983	6,178	1,909	6,178	1,704
1984	0	1,999	0	1,594
1985	0	2,090	0	1,488
1986	0	2,181	0	1,386
1987	0	2,272	0	1,289
1988	0	2,363	0	1,197
1989	0	2,454	0	1,110
TOTAL	6,178	15,268	6,178	9,768

DISCOUNTED ECONOMIC COSTS : 6,178  
DISCOUNTED ECONOMIC BENEFITS : 9,768  
NET PRESENT VALUE : 3,590  
BENEFIT COST RATIO : 1.58  
INTERNAL RATE OF RETURN : 27.9 %

PROPOSED LINK NO. RH - 5

YEAR	COST	VOC SAVING	DISCOUNTED(12%)	
			COST	BENEFIT
1983	15,606	10,510	15,606	9,384
1984	0	11,024	0	8,789
1985	0	11,539	0	8,213
1986	0	12,053	0	7,660
1987	0	12,567	0	7,131
1988	0	13,082	0	6,628
1989	0	13,596	0	6,150
TOTAL	15,606	84,371	15,606	53,954

DISCOUNTED ECONOMIC COSTS : 15,606  
DISCOUNTED ECONOMIC BENEFITS : 53,954  
NET PRESENT VALUE : 38,348  
BENEFIT COST RATIO : 3.46  
INTERNAL RATE OF RETURN : 69.7 %

PROPOSED LINK NO. RH - 6

YEAR	COST	VOC SAVING	DISCOUNTED(12%)	
			COST	BENEFIT
1983	16,881	8,143	16,881	7,270
1984	0	8,549	0	6,815
1985	0	8,955	0	6,374
1986	0	9,361	0	5,949
1987	0	9,767	0	5,542
1988	0	10,173	0	5,154
1989	0	10,579	0	4,786
TOTAL	16,881	65,527	16,881	41,890

DISCOUNTED ECONOMIC COSTS : 16,881  
DISCOUNTED ECONOMIC BENEFITS : 41,890  
NET PRESENT VALUE : 25,009  
BENEFIT COST RATIO : 2.48  
INTERNAL RATE OF RETURN : 48.8 %



## COST AND BENEFIT STATEMENT (2)

PROPOSED LINK NO. RH - 9				
YEAR	COST	VOC SAVING	DISCOUNTED(12%)	
			COST	BENEFIT
1983	4,777	1,206	4,777	1,077
1984	0	1,263	0	1,007
1985	0	1,320	0	940
1986	0	1,377	0	875
1987	0	1,434	0	814
1988	0	1,491	0	755
1989	0	1,548	0	700
TOTAL	4,777	9,639	4,777	6,168
DISCOUNTED ECONOMIC COSTS : 4,777				
DISCOUNTED ECONOMIC BENEFITS : 6,168				
NET PRESENT VALUE : 1,391				
BENEFIT COST RATIO : 1.29				
INTERNAL RATE OF RETURN : 20.3 %				

PROPOSED LINK NO. RH - 13				
YEAR	COST	VOC SAVING	DISCOUNTED(12%)	
			COST	BENEFIT
1983	54,405	9,916	54,405	8,853
1984	0	10,382	0	8,276
1985	0	10,847	0	7,721
1986	0	11,313	0	7,190
1987	0	11,779	0	6,684
1988	0	12,245	0	6,204
1989	0	12,711	0	5,750
TOTAL	54,405	79,192	54,405	50,677
DISCOUNTED ECONOMIC COSTS : 54,405				
DISCOUNTED ECONOMIC BENEFITS : 50,677				
NET PRESENT VALUE : -3,728				
BENEFIT COST RATIO : 0.93				
INTERNAL RATE OF RETURN : 9.9 %				

PROPOSED LINK NO. RH - 10				
YEAR	COST	VOC SAVING	DISCOUNTED(12%)	
			COST	BENEFIT
1983	7,794	1,906	7,794	1,702
1984	0	2,007	0	1,600
1985	0	2,108	0	1,501
1986	0	2,209	0	1,404
1987	0	2,310	0	1,311
1988	0	2,411	0	1,222
1989	0	2,512	0	1,136
TOTAL	7,794	15,465	7,794	9,876
DISCOUNTED ECONOMIC COSTS : 7,794				
DISCOUNTED ECONOMIC BENEFITS : 9,876				
NET PRESENT VALUE : 2,082				
BENEFIT COST RATIO : 1.27				
INTERNAL RATE OF RETURN : 19.6 %				

PROPOSED LINK NO. RH - 14				
YEAR	COST	VOC SAVING	DISCOUNTED(12%)	
			COST	BENEFIT
1983	59,809	11,609	59,809	10,365
1984	0	12,143	0	9,630
1985	0	12,677	0	9,023
1986	0	13,211	0	8,396
1987	0	13,745	0	7,799
1988	0	14,279	0	7,234
1989	0	14,813	0	6,701
TOTAL	59,809	92,475	59,809	59,197
DISCOUNTED ECONOMIC COSTS : 59,809				
DISCOUNTED ECONOMIC BENEFITS : 59,197				
NET PRESENT VALUE : -612				
BENEFIT COST RATIO : 0.99				
INTERNAL RATE OF RETURN : 11.7 %				

PROPOSED LINK NO. RH - 12				
YEAR	COST	VOC SAVING	DISCOUNTED(12%)	
			COST	BENEFIT
1983	4,077	746	4,077	666
1984	0	782	0	624
1985	0	818	0	582
1986	0	854	0	543
1987	0	891	0	505
1988	0	927	0	469
1989	0	963	0	435
TOTAL	4,077	5,981	4,077	3,826
DISCOUNTED ECONOMIC COSTS : 4,077				
DISCOUNTED ECONOMIC BENEFITS : 3,826				
NET PRESENT VALUE : -251				
BENEFIT COST RATIO : 0.94				
INTERNAL RATE OF RETURN : 10.1 %				

PROPOSED LINK NO. RH - 15				
YEAR	COST	VOC SAVING	DISCOUNTED(12%)	
			COST	BENEFIT
1983	29,811	16,503	29,811	14,735
1984	0	17,314	0	13,802
1985	0	18,125	0	12,901
1986	0	18,936	0	12,034
1987	0	19,746	0	11,205
1988	0	20,557	0	10,415
1989	0	21,368	0	9,666
TOTAL	29,811	132,549	29,811	84,757
DISCOUNTED ECONOMIC COSTS : 29,811				
DISCOUNTED ECONOMIC BENEFITS : 84,757				
NET PRESENT VALUE : 54,946				
BENEFIT COST RATIO : 2.84				
INTERNAL RATE OF RETURN : 56.8 %				

## COST AND BENEFIT STATEMENT (3)

PROPOSED LINK NO. RH - 16					PROPOSED LINK NO. RH - 17					PROPOSED LINK NO. RH - 18				
YEAR	COST	VOC SAVING	DISCOUNTED(12%)		YEAR	COST	VOC SAVING	DISCOUNTED(12%)		YEAR	COST	VOC SAVING	DISCOUNTED(12%)	
			COST	BENEFIT				COST	BENEFIT				COST	BENEFIT
1983	10,184	4,425	10,184	3,951	1983	6,178	2,233	6,178	1,994	1983	20,257	16,138	20,257	14,409
1984	0	4,634	0	3,694	1984	0	2,343	0	1,868	1984	0	16,941	0	13,505
1985	0	4,842	0	3,446	1985	0	2,454	0	1,746	1985	0	17,744	0	12,630
1986	0	5,050	0	3,209	1986	0	2,564	0	1,629	1986	0	18,547	0	11,787
1987	0	5,258	0	2,984	1987	0	2,674	0	1,518	1987	0	19,350	0	10,980
1988	0	5,467	0	2,770	1988	0	2,785	0	1,411	1988	0	20,154	0	10,210
1989	0	5,675	0	2,567	1989	0	2,895	0	1,310	1989	0	20,957	0	9,480
TOTAL	10,184	35,351	10,184	22,621	TOTAL	6,178	17,948	6,178	11,475	TOTAL	20,257	129,831	20,257	83,001
DISCOUNTED ECONOMIC COSTS : 10,184					DISCOUNTED ECONOMIC COSTS : 6,178					DISCOUNTED ECONOMIC COSTS : 20,257				
DISCOUNTED ECONOMIC BENEFITS : 22,621					DISCOUNTED ECONOMIC BENEFITS : 11,475					DISCOUNTED ECONOMIC BENEFITS : 83,001				
NET PRESENT VALUE : 12,437					NET PRESENT VALUE : 5,297					NET PRESENT VALUE : 62,744				
BENEFIT COST RATIO : 2.22					BENEFIT COST RATIO : 1.86					BENEFIT COST RATIO : 4.10				
INTERNAL RATE OF RETURN : 43.1 %					INTERNAL RATE OF RETURN : 34.5 %					INTERNAL RATE OF RETURN : 82.8 %				
PROPOSED LINK NO. RH - 19					PROPOSED LINK NO. RH - 20					PROPOSED LINK NO. RH - 21				
YEAR	COST	VOC SAVING	DISCOUNTED(12%)		YEAR	COST	VOC SAVING	DISCOUNTED(12%)		YEAR	COST	VOC SAVING	DISCOUNTED(12%)	
			COST	BENEFIT				COST	BENEFIT				COST	BENEFIT
1983	74,325	23,414	74,325	20,905	1983	14,184	4,131	14,184	3,688	1983	12,535	3,184	12,535	2,843
1984	0	24,605	0	19,615	1984	0	4,336	0	3,457	1984	0	3,342	0	2,664
1985	0	25,797	0	18,362	1985	0	4,541	0	3,232	1985	0	3,500	0	2,491
1986	0	26,988	0	17,152	1986	0	4,746	0	3,016	1986	0	3,657	0	2,324
1987	0	28,180	0	15,990	1987	0	4,950	0	2,809	1987	0	3,815	0	2,165
1988	0	29,371	0	14,880	1988	0	5,155	0	2,612	1988	0	3,973	0	2,013
1989	0	30,563	0	13,825	1989	0	5,360	0	2,425	1989	0	4,131	0	1,869
TOTAL	74,325	188,918	74,325	120,729	TOTAL	14,184	33,219	14,184	21,238	TOTAL	12,535	25,602	12,535	16,368
DISCOUNTED ECONOMIC COSTS : 74,325					DISCOUNTED ECONOMIC COSTS : 14,184					DISCOUNTED ECONOMIC COSTS : 12,535				
DISCOUNTED ECONOMIC BENEFITS : 120,729					DISCOUNTED ECONOMIC BENEFITS : 21,238					DISCOUNTED ECONOMIC BENEFITS : 16,368				
NET PRESENT VALUE : 46,404					NET PRESENT VALUE : 7,054					NET PRESENT VALUE : 3,833				
BENEFIT COST RATIO : 1.62					BENEFIT COST RATIO : 1.50					BENEFIT COST RATIO : 1.31				
INTERNAL RATE OF RETURN : 28.9 %					INTERNAL RATE OF RETURN : 25.7 %					INTERNAL RATE OF RETURN : 20.7 %				

## COST AND BENEFIT STATEMENT (4)

PROPOSED LINK NO. RH - 22				
YEAR	COST	VOC SAVING	DISCOUNTED(12%)	
			COST	BENEFIT
1983	4,502	5,079	4,502	4,535
1984	0	5,400	0	4,305
1985	0	5,721	0	4,072
1986	0	6,041	0	3,839
1987	0	6,362	0	3,610
1988	0	6,683	0	3,386
1989	0	7,004	0	3,168
TOTAL	4,502	42,290	4,502	26,915

DISCOUNTED ECONOMIC COSTS : 4,502  
DISCOUNTED ECONOMIC BENEFITS : 26,915  
NET PRESENT VALUE : 22,413  
BENEFIT COST RATIO : 5.98  
INTERNAL RATE OF RETURN : 118.1 %

PROPOSED LINK NO. RH - 26				
YEAR	COST	VOC SAVING	DISCOUNTED(12%)	
			COST	BENEFIT
1983	38,455	10,092	38,455	9,011
1984	0	10,709	0	8,537
1985	0	11,325	0	8,061
1986	0	11,942	0	7,589
1987	0	12,559	0	7,126
1988	0	13,175	0	6,675
1989	0	13,792	0	6,239
TOTAL	38,455	83,594	38,455	53,238

DISCOUNTED ECONOMIC COSTS : 38,455  
DISCOUNTED ECONOMIC BENEFITS : 53,238  
NET PRESENT VALUE : 14,783  
BENEFIT COST RATIO : 1.38  
INTERNAL RATE OF RETURN : 22.7 %

PROPOSED LINK NO. RH - 23				
YEAR	COST	VOC SAVING	DISCOUNTED(12%)	
			COST	BENEFIT
1983	21,967	7,828	21,967	6,989
1984	0	8,273	0	6,595
1985	0	8,719	0	6,206
1986	0	9,164	0	5,824
1987	0	9,610	0	5,453
1988	0	10,055	0	5,094
1989	0	10,501	0	4,750
TOTAL	21,967	64,149	21,967	40,911

DISCOUNTED ECONOMIC COSTS : 21,967  
DISCOUNTED ECONOMIC BENEFITS : 40,911  
NET PRESENT VALUE : 18,944  
BENEFIT COST RATIO : 1.86  
INTERNAL RATE OF RETURN : 34.5 %

PROPOSED LINK NO. RH - 27				
YEAR	COST	VOC SAVING	DISCOUNTED(12%)	
			COST	BENEFIT
1983	9,003	1,449	9,003	1,294
1984	0	1,536	0	1,224
1985	0	1,623	0	1,155
1986	0	1,710	0	1,087
1987	0	1,797	0	1,019
1988	0	1,883	0	954
1989	0	1,970	0	891
TOTAL	9,003	11,968	9,003	7,625

DISCOUNTED ECONOMIC COSTS : 9,003  
DISCOUNTED ECONOMIC BENEFITS : 7,625  
NET PRESENT VALUE : -1,378  
BENEFIT COST RATIO : 0.85  
INTERNAL RATE OF RETURN : 7.3 %

PROPOSED LINK NO. RH - 24				
YEAR	COST	VOC SAVING	DISCOUNTED(12%)	
			COST	BENEFIT
1983	26,828	8,557	26,828	7,640
1984	0	9,043	0	7,209
1985	0	9,530	0	6,784
1986	0	10,017	0	6,366
1987	0	10,504	0	5,960
1988	0	10,991	0	5,569
1989	0	11,478	0	5,192
TOTAL	26,828	70,122	26,828	44,720

DISCOUNTED ECONOMIC COSTS : 26,828  
DISCOUNTED ECONOMIC BENEFITS : 44,720  
NET PRESENT VALUE : 17,892  
BENEFIT COST RATIO : 1.67  
INTERNAL RATE OF RETURN : 29.8 %

PROPOSED LINK NO. RH - 28				
YEAR	COST	VOC SAVING	DISCOUNTED(12%)	
			COST	BENEFIT
1983	11,242	2,234	11,242	1,995
1984	0	2,360	0	1,881
1985	0	2,486	0	1,770
1986	0	2,612	0	1,660
1987	0	2,738	0	1,554
1988	0	2,864	0	1,451
1989	0	2,991	0	1,353
TOTAL	11,242	18,286	11,242	11,664

DISCOUNTED ECONOMIC COSTS : 11,242  
DISCOUNTED ECONOMIC BENEFITS : 11,664  
NET PRESENT VALUE : 422  
BENEFIT COST RATIO : 1.04  
INTERNAL RATE OF RETURN : 13.1 %

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