

## References

- HIDE, H., ABAYNAYAKA, S.W., SAYER, I., and WYATT, R.J., (1975), The Kenya Road Transport Cost Study: Research on Vehicle Operating Costs. Department of the Environment, TRRL Report LR 672, Transport and Road Research Laboratory, Crowthorne, Berkshire, U.K.
- HODGES, J.W., ROLT, J., and JONES, T.E., (1975), The Kenya Road Transport Cost Study: Research on Road Deterioration. Department of the Environment, TRRL Report LR 673, Transport and Road Research Laboratory, Crowthorne, Berkshire, U.K.
- ROBINSON, R., HIDE, H., HODGES, J.W., ROLT, J., and ABAYNAYAKA, S.W., (1975), A Road Transport Investment Model for Developing Countries. Department of the Environment, TRRL Report LR 674, Transport and Road Research Laboratory, Crowthorne, Berkshire, U.K.
- ROBINSON, R., (1976), Road Transport Investment Model: Draft User Manual. Department of the Environment, TRRL Report SR 224 UC, Transport and Road Research Laboratory, Crowthorne, Berkshire, U.K.
- SINTHUSARN, Ekasith, (1976), Application of the TRRL Road Transport Investment Model to the Saraburi-Lomsak Highway. M.Eng. Thesis, Chulalongkorn University, Bangkok.

- T.P.C'SULLIVAN & PARTNERS, (1973), Road User Costs in Thailand,  
Technical Report No. 42; Bangkok.
- VALLENTINE, LAURIE & DAVIES, (1976), Final Report on Investment  
Alternatives in Highways in the Corridors between Ban  
Bung and Klaeng (Route 6) and Ban Bung and Ban Khai  
(Route 7), Vols. I, II; Bangkok.
- WINFREY, R., (1969), Economic Analysis for Highways, Interna-  
tional Textbook Company, Scranton, U.S.A.
- ABAYNAYAKA, SW, J D G F HOWE, G D JACOBS and G MOROSIUK., (1974),  
A Study of Factors Affecting Vehicle Speeds on Rural  
Roads in Kenya. Department of the Environment, TRRL  
Report SR 28 UC, Transport and Road Research Labora-  
tory, Crowthorne, Berkshire, U.K.

Appendix

## Appendix

Input Data of Section I

1.1	RUANG CHONGVORANGID	SECTION 2ABC-3AB	
1.2	RTIM APPLICATION IN	THAILAND	
1.3	22211.0		
1.4	THAIBAHT		
1.5	17.0	12.0	
2.1	16.85		
2.2	25000.0	120.2	
2.3	25150.0	120.2	200.0
	25400.0	113.5	300.0
	25700.0	121.5	300.0
	26300.0	117.8	300.0
	27040.0	110.6	300.0
	27600.0	101.5	200.0
	27800.0	103.8	200.0
	28020.0	101.5	200.0
	28400.0	97.0	300.0
	28840.0	85.0	200.0
	29100.0	84.5	200.0
	29600.0	80.0	600.0
	30650.0	79.0	300.0
	30950.0	89.2	300.0
	31360.0	89.7	300.0
	31660.0	77.5	300.0
	31980.0	77.5	300.0
	32500.0	87.2	300.0
	33260.0	81.7	300.0
	34180.0	66.2	200.0
	34400.0	77.4	200.0
	34720.0	77.4	200.0
	35230.0	63.5	300.0
	35600.0	63.5	200.0
	35800.0	65.7	200.0
	36300.0	61.4	200.0
	36520.0	56.5	200.0
	36760.0	66.4	200.0
	37100.0	61.5	200.0
	37300.0	66.0	200.0
	37600.0	64.5	200.0
	37800.0	68.0	200.0
	38000.0	60.0	200.0
	38590.0	60.0	300.0

	39000.0	73.0	300.0		
	39600.0	78.0	300.0		
	40140.0	70.5	300.0		
	40440.0	70.5	200.0		
	40740.0	84.2	300.0		
2.4	41000.0	84.04			
2.5					
2.6a	7.0	80.0		120.0	
3.1a	25000.0	-38.0	120.0	70.0	120.2
	25100.0	-95.0	118.7	70.0	118.8
	25200.0	-80.0	117.2	80.0	117.4
	25300.0	-60.0	115.7	30.0	116.0
	25400.0	-50.0	114.0	100.0	114.0
	25500.0	-70.0	115.0	87.0	116.0
	25600.0	-178.0	117.0	26.0	118.0
	25700.0	-32.0	120.0	27.0	121.0
	25800.0	-98.0	121.0	78.0	120.5
	25900.0	-106.0	120.5	85.0	120.0
	26000.0	-52.0	119.0	90.0	118.8
	26100.0	-191.0	119.0	159.0	118.3
	26200.0	-110.0	118.4	99.0	118.0
	26300.0	-116.0	118.0	65.0	117.1
	26400.0	-80.0	118.0	31.0	118.0
	26500.0	-82.0	117.0	82.0	115.0
	26600.0	-35.0	114.0	45.0	113.5
	26700.0	-38.0	114.0	65.0	112.0
	26800.0	-59.0	115.0	57.0	110.0
	26900.0	-30.0	111.0	40.0	109.0
	27000.0	-60.0	114.0	35.0	108.0
	27100.0	-72.0	113.0	25.0	108.0
	27200.0	-60.0	111.0	44.0	106.0
	27300.0	-37.0	108.0	32.0	105.5
	27400.0	-56.0	106.0	85.0	104.0
	27500.0	-95.0	102.0	95.0	100.5
	27600.0	-87.0	100.5	40.0	101.0
	27700.0	-35.0	102.0	151.0	103.0
	27800.0	-47.0	102.9	44.0	102.0
	27900.0	-91.0	102.0	58.0	100.5
	28000.0	-59.0	101.0	37.0	99.5
	28100.0	-69.0	101.0	50.0	98.0
	28200.0	-28.0	101.0	28.0	99.0
	28300.0	-26.0	99.0	42.0	98.0
	28400.0	-50.0	98.0	80.0	96.0
	28500.0	-71.0	96.0	92.0	94.5
	28600.0	-41.0	93.0	30.0	92.0
	28700.0	-38.0	90.0	67.0	89.0
	28800.0	-47.0	87.0	28.0	86.0
	28900.0	-58.0	85.5	41.0	84.0

29000.0	-80.0	85.3	51.0	84.0
29100.0	-150.0	85.0	21.0	84.0
29200.0	-28.0	83.0	116.0	82.5
29300.0	-31.0	81.8	25.0	82.0
29400.0	-115.0	81.5	100.0	81.0
29500.0	-216.0	81.0	95.0	80.6
29600.0	-154.0	80.4	42.0	80.2
29700.0	-100.0	80.0	100.0	80.0
29800.0	-100.0	80.0	100.0	80.0
29900.0	-100.0	80.0	25.0	80.0
30000.0	-100.0	80.0	180.0	79.3
30100.0	-57.0	79.4	86.0	79.0
30200.0	-17.0	78.0	67.0	77.5
30300.0	-41.0	77.0	74.0	78.0
30400.0	-22.0	79.5	76.0	79.6
30500.0	-100.0	79.0	100.0	79.0
30600.0	-100.0	77.0	100.0	77.0
30700.0	-20.0	81.0	25.0	79.5
30800.0	-80.0	85.0	29.0	84.0
30900.0	-43.0	87.0	188.0	86.0
31000.0	-64.0	88.7	38.0	88.6
31100.0	-78.0	89.6	80.0	89.4
31200.0	-60.0	89.7	80.0	89.8
31300.0	-144.0	89.0	81.0	89.2
31400.0	-35.0	87.6	35.0	88.1
31500.0	-25.0	84.0	59.0	85.5
31600.0	-19.0	79.0	40.0	80.0
31700.0	-26.0	75.8	52.0	77.0
31800.0	-45.0	75.3	72.0	75.0
31900.0	-130.0	77.0	45.0	76.0
32000.0	-52.0	78.0	60.0	76.8
32100.0	-35.0	81.5	59.0	80.0
32200.0	-29.0	83.0	14.0	82.0
32300.0	-24.0	83.5	39.0	82.5
32400.0	-17.0	85.0	38.0	84.0
32500.0	-33.0	87.0	20.0	86.0
32600.0	-29.0	87.0	17.0	86.0
32700.0	-20.0	86.0	16.0	85.0
32800.0	-20.0	85.0	26.0	84.0
32900.0	-37.0	85.0	56.0	83.0
33000.0	-52.0	84.0	37.0	83.0
33100.0	-140.0	83.5	79.0	82.5
33200.0	-70.0	82.2	27.0	82.0
33300.0	-60.0	80.6	70.0	80.5
33400.0	-150.0	79.0	150.0	78.8
33500.0	-93.0	77.2	80.0	77.0
33600.0	-118.0	76.0	77.0	75.3
33700.0	-42.0	74.5	61.0	74.3



33800.0	-86.0	73.0	43.0	71.8
33900.0	-51.0	70.5	47.0	69.5
34000.0	-48.0	68.5	40.0	67.0
34100.0	-15.0	62.0	10.0	60.0
34200.0	-50.0	63.0	80.0	62.0
34300.0	-50.0	69.0	20.0	71.0
34400.0	-36.0	75.5	30.0	75.7
34500.0	-50.0	77.0	50.0	77.0
34600.0	-50.0	77.0	50.0	77.0
34700.0	-50.0	77.0	50.0	77.0
34800.0	-55.0	73.5	20.0	73.2
34900.0	-46.0	71.2	44.0	71.5
35000.0	-45.0	69.7	65.0	70.5
35100.0	-22.0	66.0	17.0	68.0
35200.0	-74.0	64.0	40.0	66.0
35300.0	-105.0	60.0	50.0	62.0
35400.0	-50.0	60.0	50.0	60.0
35500.0	-85.0	61.5	22.0	61.0
35600.0	-70.0	63.3	40.0	62.5
35700.0	-30.0	65.0	75.0	64.0
35800.0	-55.0	66.0	45.0	65.0
35900.0	-35.0	66.0	38.0	65.0
36000.0	-32.0	64.0	133.0	63.0
36100.0	-44.0	63.1	60.0	62.5
36200.0	-56.0	62.2	25.0	62.0
36300.0	-30.0	61.1	30.0	61.1
36400.0	-50.0	59.1	50.0	59.1
36500.0	-50.0	57.0	50.0	57.0
36600.0	-30.0	59.5	30.0	59.5
36700.0	-105.0	64.0	62.0	63.0
36800.0	-90.0	68.0	90.0	66.0
36900.0	-130.0	65.0	122.0	63.0
37000.0	-100.0	62.0	42.0	60.0
37100.0	-75.0	60.0	100.0	59.0
37200.0	-20.0	63.0	44.0	62.0
37300.0	-45.0	67.0	38.0	64.0
37400.0	-73.0	67.0	57.0	65.0
37500.0	-94.0	65.0	35.0	64.0
37600.0	-30.0	63.4	37.0	63.5
37700.0	-26.0	65.8	20.0	65.9
37800.0	-52.0	67.0	40.0	68.0
37900.0	-45.0	65.3	52.0	65.0
38000.0	-55.0	61.0	80.0	59.0
38100.0	-90.0	56.0	32.0	55.0
38200.0	-50.0	55.0	50.0	55.0
38300.0	-20.0	55.2	30.0	55.0
38400.0	-80.0	55.7	40.0	55.5
38500.0	-20.0	57.0	20.0	57.0

	38600.0	-55.0	61.5	55.0	60.5	
	38700.0	-78.0	65.0	78.0	63.0	
	38800.0	-30.0	67.0	27.0	66.0	
	38900.0	-30.0	71.0	25.0	69.0	
	39000.0	-24.0	73.0	24.0	72.0	
	39100.0	-50.0	74.0	67.0	72.0	
	39200.0	-30.0	74.0	30.0	72.5	
	39300.0	-62.0	75.5	25.0	74.0	
	39400.0	-60.0	78.0	41.0	77.0	
	39500.0	-30.0	78.0	65.0	77.5	
	39600.0	-100.0	78.0	55.0	77.3	
	39700.0	-150.0	77.0	170.0	76.0	
	39800.0	-75.0	75.2	43.0	74.9	
	39900.0	-174.0	74.0	40.0	73.0	
	40000.0	-32.0	72.0	15.0	70.0	
	40100.0	-35.0	69.5	19.0	71.0	
	40200.0	-34.0	70.0	27.0	72.0	
	40300.0	-30.0	67.0	57.0	68.0	
	40400.0	-40.0	68.0	40.0	68.5	
	40500.0	-40.0	74.5	60.0	75.0	
	40600.0	-53.0	80.0	98.0	78.0	
	40700.0	-30.0	82.0	30.0	82.0	
	40800.0	-20.0	84.0	37.0	83.0	
	40900.0	-62.0	85.0	85.0	83.0	
	41000.0	-37.0	84.0	42.0	83.0	
3.2						
3.3	6.5	40.0	2.25	20.0	1.0	1.5
3.4	0.556	0.5		1.5	14.0	
3.5	0.0	1.25	0.8	9.06		
3.6b	18.02					
3.7b	50.62					
3.8b	0.0					
3.9b	0.0					
3.10b	0.0					
3.11	0.5					
3.12						
3.13b						
3.14	100.0					
3.15b	5454.0					
3.16	S					
3.22	4.0					
3.23	56.0	10.0	9.06	0.8	IMP.SUBG.	
3.24b		50.62				
3.23	71.0	10.0	10.0	0.8	SUBBASE	
3.24b		89.2				
3.23	173.0	6.0	80.0	0.8	BASE	
3.24b		223.9				
3.23	25.0	3.0	0.12	0.8	PDS	



3.24b	33.07						
3.25	1.0						
3.26	323.7	10.0			0.8		SHLDR.MATL.
3.27b		89.2					
3.28							
3.30	2000.0	60.0	6.0		0.0		
3.31	0.8						
3.32b	642.6						
3.31	1.0						
3.32b	1232.5						
3.33							
3.34	3.5						
3.35b	0.0						
3.36							
3.38							
3.39	3060849.0						
3.40	2940680.0						
3.41	11.0						
3.43	2.0	50.0	50.0				
4.1	12.0						
4.2							
4.3	2.13	1.91	8.5		35.4		
4.4	6.0						
4.5	1P	18000.0	0.0				
4.7							
4.8	75900.0	307.0	0.0		10.0		30.0
4.9							
4.5	2P	30000.0	2000.0				
4.7							
4.8	57200.0	508.0	6.0		25.0		10.0
4.9							
4.5	3D	60000.0	6000.0				
4.7							
4.8	172500.0	740.0	10.0		25.0		50.0
4.9							
4.5	4D	40000.0	7500.0				
4.6	120.0	5.1	6.4		6.4		0.6486 0.6486
4.7							
4.8	205190.0	1530.0	6.0		25.0		7.0
4.9							
4.5	5D	50000.0	5000.0				
4.6	120.0	6.5	8.8		8.8		0.6462 0.6462
4.7							
4.8	236650.0	1530.0	6.0		25.0		7.0
4.9							
4.5	6D	60000.0	5000.0				
4.6	240.0	8.0	12.0		12.0		1.7431 1.7431
4.7							



Input Data of Section II

1.1	RUANG CHONGVORANOND	SECTION	3C-4
1.2	RTIM APPLICATION IN	THAILAND	
1.3	22211.0		
1.4	THAIBAHT		
1.5	17.0	12.0	
2.1	8.61		
2.2	41000.0	84.04	
2.3	41400.0	83.8	300.0
	41920.0	71.2	400.0
	42440.0	80.7	300.0
	42890.0	80.6	300.0
	43200.0	71.0	300.0
	43460.0	71.0	200.0
	43700.0	77.0	200.0
	44070.0	65.5	200.0
	44300.0	65.5	200.0
	44500.0	72.2	200.0
	44700.0	72.0	200.0
	45060.0	60.5	200.0
	45240.0	68.4	160.0
	45680.0	67.5	200.0
	46000.0	70.8	200.0
	46200.0	77.8	200.0
	46520.0	77.1	200.0
	47240.0	66.5	300.0
	47960.0	67.0	300.0
	48580.0	53.0	300.0
	48940.0	59.0	200.0
	49140.0	54.5	200.0
	49340.0	59.2	200.0
	49620.0	63.8	300.0
	50120.0	64.0	300.0
	50620.0	51.0	200.0
	50850.0	51.0	200.0
	51050.0	53.2	200.0
	51710.0	50.9	300.0
	52400.0	46.2	300.0
	53000.0	37.7	300.0
	53400.0	37.7	300.0
	53760.0	35.2	300.0
	54380.0	34.0	300.0
	54700.0	34.1	300.0
	55660.0	29.3	300.0
	56200.0	29.3	200.0
	56400.0	30.25	200.0

	57040.0	30.25	200.0		
	57340.0	27.0	200.0		
	58280.0	26.8	300.0		
	59200.0	23.0	300.0		
	61400.0	23.0	300.0		
	62230.0	20.0	300.0		
	62800.0	20.0	300.0		
	63240.0	17.0	300.0		
	64240.0	17.0	200.0		
	70300.0	8.6	200.0		
2.4	70700.0	8.6			
2.5					
2.6a	7.0	80.0		120.0	
3.1a	41000.0	-37.0	84.0	42.0	85.0
	41100.0	-89.0	85.0	80.0	83.0
	41200.0	-59.0	85.0	40.0	84.0
	41300.0	-80.0	84.0	42.0	83.5
	41400.0	-25.0	83.0	109.0	82.5
	41500.0	-50.0	81.5	90.0	80.5
	41600.0	-63.0	79.5	122.0	78.8
	41700.0	-62.0	76.0	77.0	77.0
	41800.0	-40.0	73.4	81.0	74.0
	41900.0	-30.0	71.0	30.0	71.0
	42000.0	-50.0	72.2	50.0	72.2
	42100.0	-30.0	73.9	30.0	73.9
	42200.0	-40.0	77.0	45.0	76.5
	42300.0	-50.0	78.5	50.0	78.5
	42400.0	-27.0	81.0	10.0	80.0
	42500.0	-20.0	81.0	28.0	80.0
	42600.0	-32.0	81.5	62.0	80.5
	42700.0	-109.0	82.0	145.0	80.0
	42800.0	-58.0	81.0	80.0	79.0
	42900.0	-48.0	79.5	60.0	78.5
	43000.0	-126.0	78.0	160.0	77.0
	43100.0	-90.0	76.0	130.0	74.0
	43200.0	-145.0	72.0	76.0	71.0
	43300.0	-40.0	69.2	40.0	69.3
	43400.0	-30.0	69.0	30.0	69.0
	43500.0	-30.0	71.5	30.0	71.5
	43600.0	-50.0	75.7	60.0	75.5
	43700.0	-35.0	74.0	21.0	76.0
	43800.0	-31.0	72.0	60.0	73.0
	43900.0	-30.0	69.7	30.0	71.0
	44000.0	-30.0	67.6	30.0	67.4
	44100.0	-60.0	67.0	57.0	64.0
	44200.0	-40.0	66.0	60.0	64.5
	44300.0	-50.0	65.2	60.0	64.5
	44400.0	-65.0	71.0	121.0	69.0

44500.0	-35.0	72.0	88.0	71.5
44600.0	-27.0	72.0	50.0	71.7
44700.0	-40.0	72.0	88.0	71.0
44800.0	-60.0	71.0	32.0	69.0
44900.0	-70.0	66.5	81.0	65.5
45000.0	-50.0	61.0	50.0	61.0
45100.0	-65.0	59.0	60.0	62.0
45200.0	-50.0	64.0	32.0	65.0
45300.0	-30.0	69.0	105.0	68.5
45400.0	-41.0	69.0	40.0	67.5
45500.0	-28.0	67.5	50.0	66.5
45600.0	-35.0	68.0	50.0	66.5
45700.0	-25.0	68.0	42.0	67.0
45800.0	-37.0	70.0	88.0	68.0
45900.0	-30.0	71.0	60.0	69.5
46000.0	-35.0	71.0	20.0	70.0
46100.0	-22.0	73.0	32.0	71.5
46200.0	-50.0	77.5	39.0	75.0
46300.0	-58.0	79.0	45.0	77.0
46400.0	-55.0	78.0	50.0	77.5
46500.0	-85.0	78.0	35.0	77.0
46600.0	-25.0	75.0	35.0	74.0
46700.0	-45.0	75.0	21.0	74.0
46800.0	-59.0	75.0	35.0	73.0
46900.0	-33.0	72.0	60.0	70.0
47000.0	-41.0	71.0	38.0	69.0
47100.0	-51.0	71.0	50.0	68.0
47200.0	-37.0	67.5	37.0	65.9
47300.0	-72.0	66.0	92.0	65.0
47400.0	-100.0	65.0	100.0	65.0
47500.0	-70.0	64.0	42.0	66.0
47600.0	-41.0	65.0	40.0	67.0
47700.0	-35.0	65.0	50.0	67.0
47800.0	-25.0	67.0	25.0	67.0
47900.0	-40.0	66.5	40.0	67.0
48000.0	-53.0	65.0	27.0	66.0
48100.0	-70.0	63.0	70.0	65.0
48200.0	-48.0	61.0	30.0	61.5
48300.0	-166.0	59.0	60.0	59.6
48400.0	-50.0	57.0	45.0	58.0
48500.0	-50.0	54.2	50.0	54.2
48600.0	-50.0	53.0	50.0	53.0
48700.0	-20.0	55.0	96.0	54.0
48800.0	-30.0	58.0	50.0	57.0
48900.0	-20.0	60.0	75.0	59.5
49000.0	-50.0	58.3	35.0	58.5
49100.0	-30.0	55.5	40.0	54.9
49200.0	-20.0	54.0	50.0	55.0



49300.0	-83.0	58.0	40.0	58.6
49400.0	-30.0	60.0	30.0	60.0
49500.0	-25.0	61.0	83.0	61.5
49600.0	-41.0	63.0	117.0	63.5
49700.0	-36.0	63.0	50.0	64.0
49800.0	-30.0	63.0	41.0	64.5
49900.0	-28.0	63.0	20.0	65.0
50000.0	-25.0	63.0	50.0	64.5
50100.0	-30.0	62.0	25.0	63.5
50200.0	-35.0	60.5	20.0	62.0
50300.0	-30.0	59.0	90.0	60.5
50400.0	-60.0	55.0	69.0	58.0
50500.0	-36.0	51.5	30.0	54.0
50600.0	-25.0	51.5	25.0	51.5
50700.0	-40.0	52.0	30.0	50.0
50800.0	-25.0	51.0	19.0	50.0
50900.0	-24.0	52.0	25.0	51.0
51000.0	-20.0	53.0	20.0	53.0
51100.0	-27.0	52.0	30.0	53.0
51200.0	-50.0	51.0	32.0	53.0
51300.0	-77.0	52.0	32.0	53.0
51400.0	-33.0	52.0	25.0	53.0
51500.0	-24.0	51.0	56.0	52.0
51600.0	-50.0	51.0	55.0	51.5
51700.0	-29.0	50.0	90.0	51.5
51800.0	-23.0	49.0	20.0	51.0
51900.0	-30.0	48.0	30.0	51.0
52000.0	-20.0	48.0	35.0	49.0
52100.0	-30.0	49.0	30.0	49.0
52200.0	-30.0	49.0	18.0	48.0
52300.0	-90.0	48.0	120.0	46.0
52400.0	-55.0	47.0	40.0	45.0
52500.0	-45.0	45.0	20.0	43.0
52600.0	-55.0	42.5	60.0	40.0
52700.0	-80.0	48.0	58.0	46.0
52800.0	-73.0	46.0	45.0	45.0
52900.0	-32.0	37.8	30.0	37.8
53000.0	-40.0	37.0	30.0	37.1
53100.0	-82.0	37.0	100.0	37.5
53200.0	-85.0	37.7	63.0	37.9
53300.0	-30.0	37.8	30.0	38.0
53400.0	-30.0	38.0	30.0	38.0
53500.0	-57.0	37.2	30.0	38.0
53600.0	-65.0	37.0	220.0	38.0
53700.0	-30.0	37.0	118.0	38.0
53800.0	-31.0	36.5	40.0	37.5
53900.0	-50.0	36.0	150.0	37.0
54000.0	-30.0	35.0	30.0	35.0



54100.0	-30.0	35.0	30.0	35.0
54200.0	-30.0	35.0	30.0	35.0
54300.0	-30.0	34.5	30.0	34.5
54400.0	-30.0	34.0	30.0	34.0
54500.0	-30.0	34.0	30.0	34.0
54600.0	-30.0	34.0	30.0	34.0
54700.0	-30.0	34.0	30.0	34.0
54800.0	-18.0	34.0	18.0	34.0
54900.0	-30.0	34.0	30.0	34.0
55000.0	-30.0	34.0	30.0	34.0
55100.0	-140.0	33.0	58.0	34.0
55200.0	-30.0	33.0	30.0	33.0
55300.0	-30.0	33.0	30.0	33.0
55400.0	-30.0	32.9	30.0	32.9
55500.0	-55.0	32.2	47.0	33.0
55600.0	-90.0	31.7	30.0	32.0
55700.0	-87.0	31.2	85.0	32.0
55800.0	-45.0	29.8	40.0	30.1
55900.0	-22.0	28.0	41.0	29.0
56000.0	-88.0	29.3	29.4	40.0
56100.0	-79.0	29.7	50.0	29.3
56200.0	-20.0	30.0	23.0	30.5
56300.0	-50.0	29.85	30.0	30.0
56400.0	-30.0	29.0	30.0	29.0
56500.0	-30.0	29.0	30.0	29.0
56600.0	-30.0	29.0	30.0	29.0
56700.0	-30.0	29.0	30.0	29.0
56800.0	-37.0	25.5	37.0	26.0
56900.0	-37.0	28.0	20.0	27.0
57000.0	-45.0	27.5	15.0	26.0
57100.0	-20.0	27.1	20.0	26.0
57200.0	-30.0	26.0	30.0	26.0
57300.0	-30.0	26.0	30.0	26.0
57400.0	-30.0	26.0	30.0	26.0
57500.0	-42.0	27.75	30.0	27.7
57600.0	-30.0	27.25	40.0	27.9
57700.0	-25.0	27.0	25.0	27.0
57800.0	-25.0	27.0	25.0	27.0
57900.0	-25.0	27.0	25.0	27.0
58000.0	-25.0	27.0	25.0	27.0
58100.0	-25.0	27.0	25.0	27.0
58200.0	-25.0	27.0	25.0	27.0
58300.0	-30.0	26.8	30.0	26.8
58400.0	-30.0	25.95	30.0	25.95
58500.0	-51.0	25.7	38.0	26.0
58600.0	-60.0	25.45	18.0	26.0
58700.0	-60.0	25.2	40.0	26.0
58800.0	-62.0	24.95	140.0	25.5

58900.0	-80.0	24.65	80.0	24.75
59000.0	-30.0	24.4	75.0	24.45
59100.0	-40.0	24.1	81.0	24.15
59200.0	-51.0	23.0	110.0	23.5
59300.0	-35.0	22.3	108.0	22.4
59400.0	-30.0	22.0	30.0	22.0
59500.0	-30.0	22.0	30.0	22.0
59600.0	-30.0	22.0	30.0	22.0
59700.0	-30.0	22.0	30.0	22.0
59800.0	-30.0	22.0	30.0	22.0
59900.0	-30.0	22.0	30.0	22.0
60000.0	-30.0	22.0	30.0	22.0
60100.0	-15.0	23.0	15.0	23.0
60200.0	-55.0	22.9	30.0	22.5
60300.0	-30.0	22.5	30.0	22.0
60400.0	-45.0	22.2	30.0	22.0
60500.0	-30.0	22.0	30.0	22.0
60600.0	-72.0	22.25	30.0	22.0
60700.0	-55.0	22.5	30.0	22.0
60800.0	-97.0	22.75	30.0	22.0
60900.0	-106.0	23.0	30.0	22.0
61000.0	-165.0	23.0	30.0	22.0
61100.0	-30.0	22.1	30.0	22.0
61200.0	-30.0	22.0	30.0	22.0
61300.0	-30.0	22.0	30.0	22.0
61400.0	-30.0	22.0	30.0	22.0
61500.0	-30.0	22.0	30.0	22.0
61600.0	-30.0	21.8	30.0	21.8
61700.0	-30.0	21.3	30.0	21.2
61800.0	-50.0	20.8	50.0	20.8
61900.0	-50.0	20.8	50.0	20.8
62000.0	-30.0	20.75	30.0	20.7
62100.0	-30.0	20.2	30.0	20.1
62200.0	-30.0	19.5	25.0	18.0
62300.0	-30.0	19.0	30.0	19.0
62400.0	-30.0	19.0	30.0	19.0
62500.0	-30.0	19.0	30.0	19.0
62600.0	-30.0	19.0	30.0	19.0
62700.0	-30.0	19.0	30.0	19.0
62800.0	-30.0	19.0	30.0	19.0
62900.0	-38.0	18.5	70.0	19.0
63000.0	-72.0	18.0	62.0	18.6
63100.0	-60.0	17.6	70.0	18.2
63200.0	-87.0	16.5	96.0	17.5
63300.0	-45.0	15.0	75.0	16.5
63400.0	-30.0	15.0	30.0	15.0
63500.0	-30.0	15.0	30.0	15.0
63600.0	-30.0	15.1	30.0	15.0

63700.0	-35.0	16.0	30.0	15.0
63800.0	-20.0	17.0	37.0	16.0
63900.0	-20.0	17.0	74.0	16.4
64000.0	-30.0	17.0	30.0	17.0
64100.0	-30.0	17.0	30.0	17.0
64200.0	-25.0	16.5	30.0	16.0
64300.0	-25.0	16.5	30.0	16.0
64400.0	-20.0	16.0	20.0	16.0
64500.0	-30.0	16.0	30.0	16.0
64600.0	-30.0	16.0	30.0	16.0
64700.0	-30.0	16.0	30.0	16.0
64800.0	-30.0	16.0	30.0	16.0
64900.0	-30.0	15.2	30.0	15.2
65000.0	-30.0	14.3	30.0	14.3
65100.0	-30.0	14.3	30.0	14.3
65200.0	-60.0	14.8	40.0	14.95
65300.0	-57.0	14.2	57.0	14.35
65400.0	-47.0	13.2	30.0	13.5
65500.0	-45.0	13.5	33.0	13.6
65600.0	-30.0	14.0	30.0	14.0
65700.0	-30.0	14.0	30.0	14.0
65800.0	-30.0	14.0	30.0	14.0
65900.0	-30.0	14.0	30.0	14.0
66000.0	-30.0	14.0	30.0	14.0
66100.0	-30.0	14.0	30.0	14.0
66200.0	-30.0	14.0	30.0	14.0
66300.0	-30.0	14.0	30.0	14.0
66400.0	-30.0	14.0	30.0	14.0
66500.0	-78.0	12.3	32.0	12.8
66600.0	-140.0	12.0	78.0	12.5
66700.0	-30.0	12.7	30.0	12.7
66800.0	-30.0	13.0	30.0	13.0
66900.0	-30.0	13.0	30.0	13.0
67000.0	-30.0	12.9	30.0	12.95
67100.0	-71.0	12.4	45.0	12.5
67200.0	-50.0	11.8	30.0	12.1
67300.0	-30.0	11.5	30.0	12.0
67400.0	-60.0	11.0	20.0	12.0
67500.0	-80.0	10.2	40.0	11.5
67600.0	-30.0	11.0	30.0	11.0
67700.0	-30.0	11.0	30.0	11.0
67800.0	-30.0	11.0	30.0	11.0
67900.0	-30.0	11.0	30.0	11.0
68000.0	-30.0	11.0	30.0	11.0
68100.0	-30.0	11.0	30.0	11.0
68200.0	-30.0	11.0	30.0	11.0
68300.0	-30.0	10.9	30.0	10.9
68400.0	-30.0	10.5	100.0	10.65

	68500.0	-30.0	10.3	170.0	10.4	
	68600.0	-30.0	10.1	80.0	10.1	
	68700.0	-30.0	10.1	30.0	10.0	
	68800.0	-30.0	11.0	30.0	11.0	
	68900.0	-30.0	11.0	30.0	11.0	
	69000.0	-30.0	11.0	30.0	11.0	
	69100.0	-30.0	11.0	30.0	11.0	
	69200.0	-30.0	11.0	30.0	11.0	
	69300.0	-30.0	11.0	30.0	11.0	
	69400.0	-30.0	11.0	30.0	11.0	
	69500.0	-30.0	11.0	30.0	11.0	
	69600.0	-30.0	11.0	30.0	11.0	
	69700.0	-30.0	11.0	52.0	10.6	
	69800.0	-35.0	11.0	30.0	10.2	
	69900.0	-58.0	11.0	52.0	10.0	
	70000.0	-65.0	10.7	30.0	10.0	
	70100.0	-35.0	10.3	30.0	10.0	
	70200.0	-30.0	9.5	30.0	10.0	
	70300.0	-30.0	10.0	30.0	10.0	
	70400.0	-50.0	9.65	30.0	9.45	
	70500.0	-30.0	9.15	30.0	9.15	
	70600.0	-30.0	9.0	30.0	9.0	
	70700.0	-23.0	8.0	30.0	9.0	
3.2						
3.3	6.0	40.0	2.0	20.0	1.0	1.5
3.4	0.575	0.5		1.5	13.0	
3.5	0.0	1.25	0.8	20.0		
3.6b	18.02					
3.7b	50.62					
3.8b	0.0					
3.9b	0.0					
3.10b	0.0					
3.11	0.5					
3.12						
3.13b						
3.14	100.0					
3.15b	5454.0					
3.16	S					
3.22	2.0					
3.23	172.0	6.0	80.0	0.8	BASE	
3.24b		223.9				
3.23	25.0	3.0	0.12	0.8	PDS	
3.24b	33.07					
3.25	1.0					
3.26	200.3	10.0		0.8	SHLDR.MATL.	
3.27b		89.2				
3.28						
3.30	2000.0	60.0	6.0	0.0		

3.31	0.8					
3.32b	642.6					
3.31	1.0					
3.32b	1232.5					
3.33						
3.34	3.5					
3.35b	0.0					
3.36						
3.38						
3.39	8228072.0					
3.40	5415052.0					
3.41	11.0					
3.43	2.0	50.0	50.0			
4.1	12.0					
4.2						
4.3	2.13	1.91	8.5	35.4		
4.4	6.0					
4.5	1P	18000.0	0.0			
4.7						
4.8	75900.0	307.0	0.0	10.0	30.0	
4.9						
4.5	2P	30000.0	2000.0			
4.7						
4.8	57200.0	508.0	6.0	25.0	10.0	
4.9						
4.5	3D	60000.0	6000.0			
4.7						
4.8	172500.0	740.0	10.0	25.0	50.0	
4.9						
4.5	4D	40000.0	7500.0			
4.6	120.0	5.1	6.4	6.4	0.6486	0.6486
4.7						
4.8	205190.0	1530.0	6.0	25.0	7.0	
4.9						
4.5	5D	50000.0	5000.0			
4.6	120.0	6.5	8.8	8.8	0.6462	0.6462
4.7						
4.8	236650.0	1530.0	6.0	25.0	7.0	
4.9						
4.5	6D	60000.0	5000.0			
4.6	240.0	8.0	12.0	12.0	1.7431	1.7431
4.7						
4.8	1294000.0	1530.0	6.0	25.0	7.0	
4.9						
4.10	3.0	46.0	176.0	99.0		
4.11	99.0	44.0	0.0			
4.10	4.0	113.0	176.0	106.0		
4.11	103.0	50.0	0.0			







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