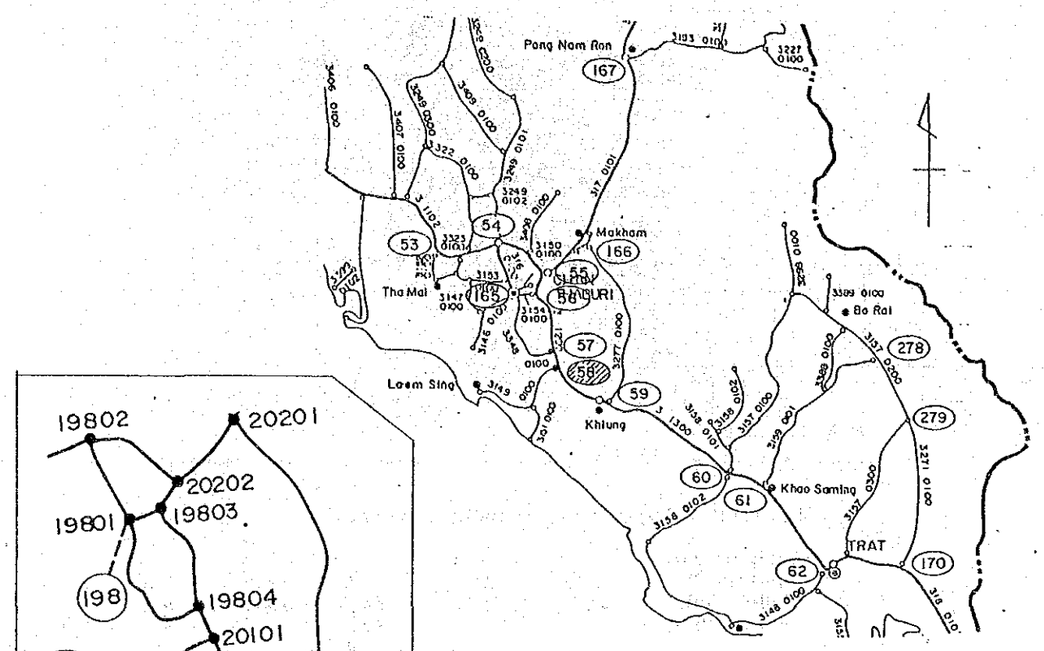
Appendix 7.2.2 CBR DATA FOR REHABILITATION STUDY LINKS

District	Route-Link	CBR (%)				Remarks
		Subgrade	S/M*	Sub-Base	Base	
431 (Lop Buri)	3196-0200	≧1.5	≧8.0	≧25	≧90	*Selected/
432 (Sara Buri)	1-0302	≧2.0				Material
	2090-0101	≧6.0				
	3049-0100	≧2.0				
	3051-0100	≧2.0				
	3063-0101	≧2.0	≧6.0	≧25	≧90	
433 (Chai Nat)	1-0700	≧2.0				
	1-0801	≧2.0				
	1-1001	≧2.0				
	311-0200	≧2.0				
	3039-0301	≧2.0				
435 (Lam Narai)	2275-0100	≧2.0	≧10	≧25	≧90	
437 (Nakhon Sawan)	1-1203	≧4.5				
	225-0100	≧2.0	≧6.0	≧25	≧90	
	1072-0100	≧2.0				
	1072-0200	≧2.0				
421 (Chachoengso)	3121-0100	≧1.5				
422 (Chon Buri)	332-0100	≧6.0	≧10	≧25	≧80	
	344-0200	≧6.0	≧10	≧30	≧80	
	3127-0101	≧1.5				
	3127-0102	≧1.5				
424 (Prachin Buri)	3070-0100	≧6.0				
	3078-0100	≧5.0				
425 (Trat)	3-1300	≧6.0				*Selected/
426 (Rayong)	3191-0100	≧3.5				Material
427 (Watthana Nakhon)	3067-0100	≧4.0				
	3384-0100	≧4.0				
	3395-0100	≧4.5				
	3395-0200	≧4.0				
411 (Bangkok)	3116-0100	≧1.5				
412 (Dan Pon)	323-0400	≧5.0				
	323-0500	≧4.5				
	3081-0100	≧2.0				
	3209-0200	≧6.0				
413 (Ayutthaya)	308-0100	≧2.0				
	3056-0100	≧2.0				
	3195-0102	≧2.0	≧6.0	≧30	≧90	
	3267-0101	≧2.0				
	3373-0100	≧2.0				
	3412-0100	≧2.0	≧10	≧25	≧90	
414 (Suphan Buri)	3032-0202	≧2.0				
	3230-0100	≧2.5	≧8.0	≧25	≧90	
	3318-0100	≧1.5	≧10	≧25	≧90	
	3356-0100	≧2.0				
415 (Thon Buri)	4-0100	≧2.0	-	-	-	
	4-0201	≧2.0	-	-	-	
	3235-0100	≧3.0	≧5.0	≧25	≧90	
416 (Pathumthani)	3035-0200	≧1.5		≧30	≧80	

District	Route-Link	CBR (%)				
		Subgrade	S/B*	Sub-Base	Base	Remarks
	3214-0100	≧2.0				*Selected/
335 (Ratcha Buri)	325-0200	≧6.0	≧6.0	≧20	≧95	Material
	3087-0101	≧4.0		≧12	≧80	
	3089-0101	≧2.0	≧6.0	≧20	≧80	
	3093-0100	≧4.0				
	3207-0100	≧6.0	≧10	≧25	≧90	
	3237-0100	≧2.0				
	3291-0100	≧3.0	≧6.0	≧25	≧90	
	3335-0100	≧1.5				
333 (Hua Hin)	3167-0100	≧4.0				
	3176-0100	≧3.5				
	3219-0100	≧5.0				

Appendix 10.2.1 ANALYSIS OF UNSIGNALIZED INTERSECTIONS



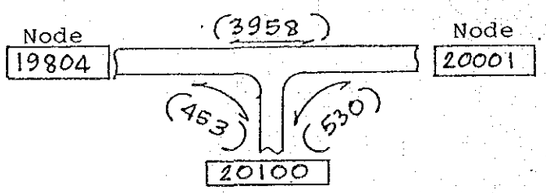
Average Running Speed at IS 58 : 90 km/hr
Minor Road (Rt3149): 2-lanes

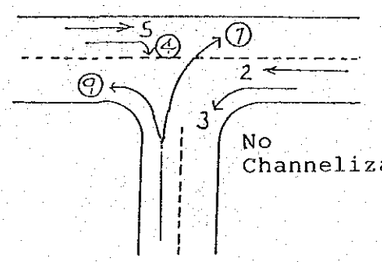
LOCATION: 58 (20101) 3 - 3149

(ADT)

INTERSECTION NO. 20101

NODE	19804	20001	20100	
19804	0.	3958.	453.	4411.
20001	3959.	0.	530.	4488.
20100	452.	530.	0.	982.
	4411.	4488.	982.	9881.





Movement No.	2	3	4	5	7	9
Volume(vph)	3958	530	453	3958	530	453
	396	53	45	396	53	45
Vol.(pcph)			49		57	49

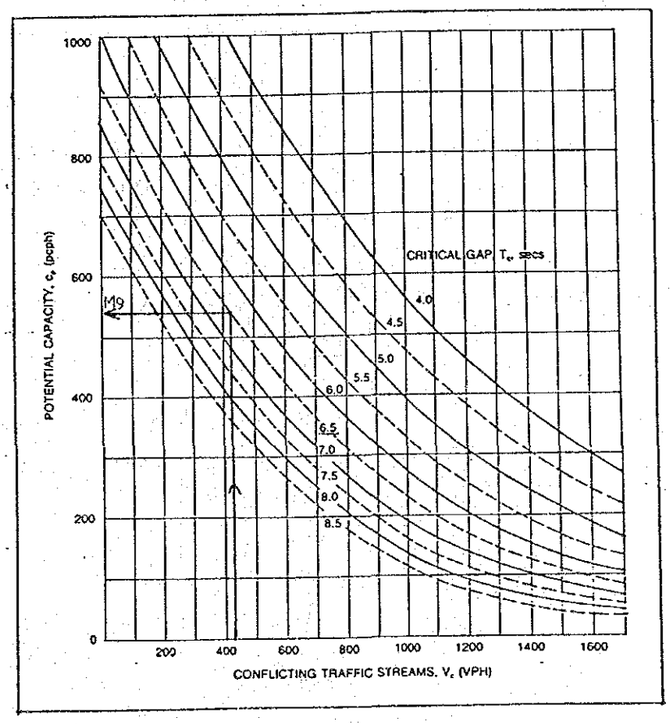
Step 1 LT from Rt.3149 M9

Conflicting flow V9 = 1/2V3 + V2 = 26 + 396 = 422

Critical Gap T_{c9} = 6.5 sec.

Vehicle Maneuver	Average Running Speed, Major Road 50 km/hr	90 km/hr
1 Left turn from Minor Road	5.5	6.5 — T_{c9}
2 Right turn from Major Road	5.0	5.5 — T_{c4}
3 Cross Major Road	6.0	7.5
4 Right turn from Minor Road	6.5	8.0 — T_{c7}

Potential Capacity C_{p9} = 540 pcph



Step 2 RT from Rt.3 M4

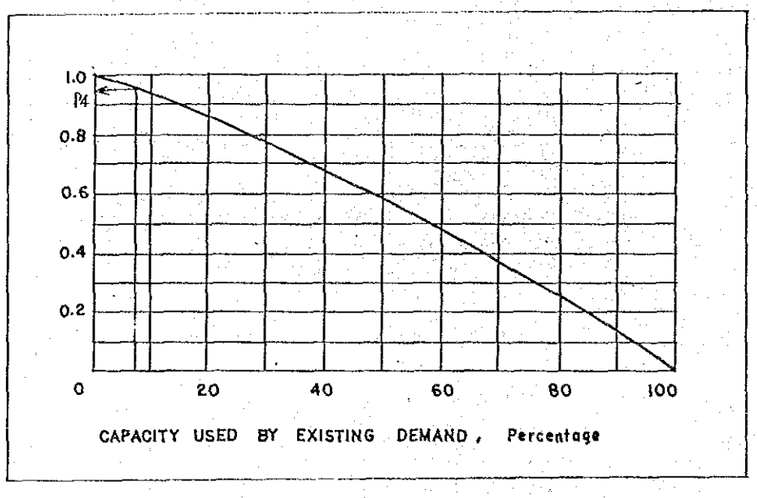
Conflicting flow V4 = V2 + V3 = 396 + 53 = 449

Critical Gap Tc_4 = 5.5 sec.

Potential Capacity Cp4 = 660 pcph

Inpedans Factor f = V4/Cp4 = 49/660 = 0.074

p4 = 0.96



Step 3 RT from Tr.3149 M7

Conflicting flow V7 = V2+ 1/2V3 + V4 + V5

= 396 + 26 + 45 + 396 = 863

Critical Gap Tc = 8.0 sec.

Potential Capacity Cp7 = 188

Actual Capacity Cm7 = Cp7 x P4 = 188 x 0.96 = 181

Level of Service

Movement No.	V	Cm	CSH	CR	LOS
7	57	181	261*	155	D
9	49	540			
4	49	660		611	A

* Shared lane

$$CSH = \frac{V7 + V9}{\frac{V7}{Cm7} + \frac{V9}{Cm9}}$$

Reserve Capacity (PCPH)	Level of Service	Expected Delay to Minor Street Traffic
≥400	A	Little or no delay
300-399	B	Short traffic delays
200-299	C	Average traffic delays
100-199	D	Long traffic delays
0-99	E	Very long traffic delays
a	F	a

Computer Output

LOCATION : 58(20101) NAME : 3-3149

MOVEMENT NO.	2	3	4	5	7	9
VOLUME(VPD)	3958	530	453	3958	530	453
VOLUME(VPH)	396.	53.	45.	396.	53.	45.
VOL.(PCPH)			49.		57.	49.

MOVEMENT NO.	V(PCPH)	CM(PCPH)	SH(PCPH)	CR	
7	57.	180.	260.	155.	D
9	49.	541.			
4	49.	660.		611.	A

SEQ. NO.	Route No.	DOH Distr. Code	Intersection		Number of Lanes Mjr.- Mir.	Level of Service		Remarks
176 (13603)	3260 321- 3387	414	4	13601 10402 / 13604 13605	2-2	A1 C A2,A3	x	
177 (13604)	321-3356	414	3	14103 13603 / 13605	2-2	C A	x	
178 (14103)	321-324	414	3	9302 14102 / 13604	2-2	B A1 A2	x	
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	

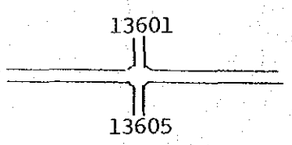
(a) Intersection Number
( ) Node Number

(b) 321 - 3356
Major Road - Minor Road

(c) DOH District Code (Location of Intersection)

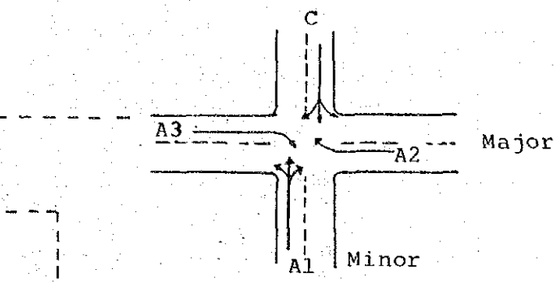
(d) Intersection; 4 : Four-Leg I.S.
3 : T-I.S.

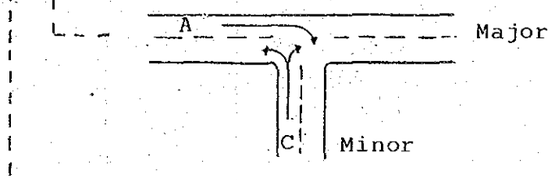
(e) Node 13604

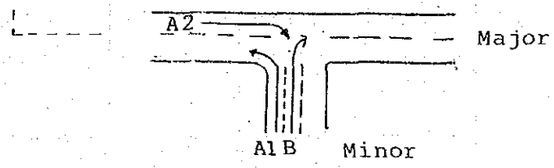


(f) Number of Lanes 2 - 2 Minor Road
Major Road

(g) Level of Service



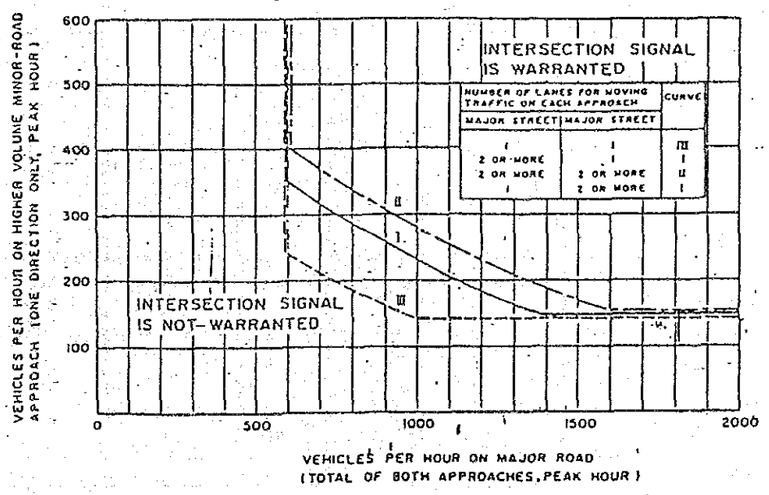




(h) Warrant Decision for I.S. Signal Installation Based on the FIGURE

O Signal is WARRANTED

X Signal is NOT WARRANTED



(1)

SEQ. NO.	Route No.	DOH Distr. Code	Intersection		Number of Lanes Mjr.-Mir.	Level of Service	Remarks
1 (4802)	1-32	413	3	4901 4101 / 4203	4-2	F O C D	Signalized IS Analysis
2 (4901)	1-309 3189	413	4	5001 / 4802 6801 / 3903	4-2(D)	E-F O D,F E,E	Signalized IS Analysis
3 (6802)	1-33 329	432	4	5501 6902 / 6801 7301	4-2	F,D O F,C E,E	Signalized IS Analysis
4 (6902)	1-3041	432	3	6601 6802 / 6901	4-2	E X E	Signalized IS Analysis
5 (6601)	C.Saraburi	432		6602 9692 / 6703	Signal		Saraburi bypass planned
6 (6602)	-3225	432	3		Data N.A.		
7 (6603)	-3048	432	3	7203 6602 / 7101	4-2	F O C	Signalized IS Analysis
8 (7203)	-21	432	3	6603 7201 / 6302	4-2	E O C C	6302-7201 scarce traffic
9 (7201)	A.Phra Phuttabat	431			Municipal Area		
10 (5803)	-3017	431	3	7201 5802 / 7202	4-2	E X A	7202-5802 delays
11 (5802)	M.Lop Buri	431			Rotary		
12 (5902)	-3024	431	3	6001 5802 / 5901	2-2	B X A	
13 6001)	-205	431	4	6002 / 6003 5902 / 5901	4-2(D) Channelized	A-A X A-A A-A	
14 (6003)	3326 3326	430	4	6502 / 1701 6001 / 5903	2-2	A X A A,A	
15 (1701)	-11	430	4	1602 / 801 6003 / 804	2-2	A-C X A-D A,A	
16 (802)	-3329	430	3	801 803 / 1204	2-2	A X A	
17 (803)	-3196	430	3	2703 802 / 804	2-2	A X A	

(2)

SEQ. NO.	Route No.	DOH Distr. Code	Intersection		Number of Lanes Mjr.-Mir.	Level of Service	Remarks
18 (2703)	1-32	433	4	2701 2903 / 7802 803	2-2 Channelized	C-F X B-F A,A	
19 (2701)	-311	433	3	2901 2703 / 2702	2-2(D)	A X A	
20 (2901)	3265 3212	433	3 (4)	2701 2902 / 2903	2-2	A X A	
21 (2902)	-32	433	3	902 2903 / 2901	2-2	F O A	Signalized ISAnalysis
22 (902)	-333	436	3	901 2902 / 1901	2-2	F O B A	1901-2902 delays
23 (901)	-3008	436	4	702 703 902 / 900	2-2	D,A X E,A A,A	703-702 delays
24 (702)	-225	437	3	901 701 / 1002	2-2	E X A A	1002-701 delays
25 (701)	M.N.Sawan	437			Municipal Area		
26 (1402)	-1072	437	3	1502 701 / 1401	2-2	F X A	1401-701 delays
27 (1502)	-1073	437	3	1402 21002 / 1501	2-2	D X A	1501-21002 delays
28 (6703)	2-3188	432	3	6704 6601 / 6701	4-2	E X B	6701-6601 delays
29 (6704)	-3222	432	3	6703 6702 / 17201	4-2	F X B	17201-6702 delays
30 (6702)	-3188	432	3	7403 6704 / 6701	4-2	D X B	6701-6704 delays
31 (7403)	-2224	432	3	7401 6702 / 7402	4-2	E X B	7402-6702 delays
32 (7401)	-2089	432	3	20404 7403 / 7402	4-2	F O C	Signalized IS Analysis
33 (19602)	3-3117	410	3	14802 19301 / 19001	2-2	C X A	
34 14802)	-314	422 421	3		IC		

(3)

SEQ. NO.	Route No.	DOH Distr. Code	Intersection		Number of Lanes Mjr.-Mir.	Level of Service	Remarks
35 (15401)	M.Chon Buri	422			Municipal Area		
36 (15402)	3-3	422	3		Signal		Signalized IS Analysis
37 (15403)	-315	422	4		Signal		
38 (15404)	-344	422	4		Signal		
39 (15406)	- New Hwy.	422	3	15404 15605 / 15405	4-2	F O B D	Signal Analysis
40 (15405)	-3	422	3		IC		
41 (15601)	-3241	422	(4)	15405 15605 15606 / 16100	4-2	C O F B,C	Signalized IS Analysis
42 (15606)	New Hwy -3241	422	4	15406 15603 15902 / 15601	4-4	F X F D,D	Signalized IS Analysis
43 (15606)	- New Hwy.	422	3	15602 15601 / 15605	4-4	A X A	
44 (15602)	-36	422	3	15901 15606 / 15902	4-2	D O E	15902-15606 traffic scarece
45 (16002)	-332	422	3	16001 16401 / 16004	4-2	E X A A	16004-16401 delays
46 (16003)	-331	422	3	19102 16001 / 16004	4-2	A X A	
47 (19102)	-332	422	3	19101 16003 / 16004	4-2	F O E	Signalized IS Analysis
48 (19101)	-3376	426	3	19105 19102 / 19103	4-2	F O C	Signalized IS Analysis
49 (19105)	3191 - 3392	426	3 (4)	18701 19101 / 19106	4-2	A X A	
50 (18701)	M.Rayong	426			Municipal Area		
51 (18702)	-36	426	3	18802 18701 / 18703	4-2	E X A	18703-18701 delays

(4)

SEQ. NO.	Route No.	DOH Distr. Code	Intersection		Number of Lanes Mjr.-Mir.	Level of Service	Remarks
52 (18801)	3-344	426	3	19902 18802 / 19201	4-2(D)	D X A A	Signalized IS Analysis
53 (19902)	-3152	423	3	18801 19802 / 19901	4-2	E X A	19901-19802 delays
54 (19802)	316 - 3249	423	3 (4)	19902 20202 / 19801	4-4	F O B	
55 (20202)	-317	423	3	20201 19803 / 19802	2-2	E X A	19802-19803 delays
56 (19803)	-3154	423	3	20202 19804 / 19801	2-2	F O D	Signalized IS Analysis
57 (19804)	-3348	423	3	19803 20101 / 19801	2-2	C O A	
58 (20101)	-3149	423	3	19804 20001 / 20100	2-2	D X A	20100-20001 delays
59 (20001)	-3277	423	3	16702 20101 / 20201	2-2	D X A	20201-20101 delays
60 (16702)	-3156	425	3	20001 16701 / 16602	2-2	C X A	
61 (16701)	-3159	425	3	16501 16702 / 16703	2-2	D X A	16703-16702 delays
62 (16501)	M.Trat	425			Municipal Area		
63 (305)	4-340	410	4		Data N.A.		
64 (10203)	3091 - 3414	410	4	10201 10204 305 / 13001	4-2	E,F O F F,E	Signalized IS Analysis
65 (10201)	-3415	410	3	10203 10102 / 10202	4-2	F O F	Signalized IS Analysis
66 (10102)	-338	410	4		IC Planned		
67 (10101)	-3235	410	3	10102 10002 / 10501	4-2	F O F	Signalized IS Analysis
68 (10002)	4 - 3097	410	4	10001 10101 / 10003 13103	4-2	F O F F,E	Signalized Is Analysis

(5)

SEQ. NO.	Route No.	DOH Distr. Code	Intersection		Number of Lanes Mjr.-Mir.	Level of Service	Remarks
69 (10003	4-321	410	3		I.C. Planned		
70 (12104	-323	410	3		I.C.		
71 (12103	-4	410	3		- Old road		
72 (12202)	4 -325	410	4	12201 12103 / 12203 12401	4-2	F O F E,B	Signalized IS Analysis
73 (12201)	-3080	335	3		- A.Photharam		
74 (12203)	-4	335	3	12202 12005 / 12201	4-2	F O D	Signalized IS Analysis
75 (12002)	-4	335	3		- Ratchaburi		
76 (12003)	-3087	335	3		- Ratchaburi		
77 (12004)	4 -3208	335	4		- Ratchaburi		
78 (12001)	M.Ratchaburi	335			Municipal Area		
79 (12501)	-3093	335	3 (4)	12502 12004 / 12504	4-2	F O A	12504-12004 delays
80 (12502)	-35	335	3	11601 12501 / 12503	4-4	E O F F	Signalized IS Analysis
81 (11901)	-3349	335	3	11601 11802 / 11900	4-2	E X C	Signalized IS Analysis
82 (11802)	-3204	335	3	11901 11302 / 11801	4-2	E X C	Signalized IS Analysis
83 (11302)	-4	333	3		- Phetchaburi		
84 (11301)	M.Phetchaburi	333			Municipal Area		
85 (11303)	-3171	333	3		- Phetchaburi		

(6)

SEQ. NO.	Route No.	DOH Distr. Code	Intersection		Number of Lanes Mjr.-Mir.	Level of Service	Remarks
86 (11304	4-4	333	3		- Phetchaburi		
87 (10602	-326	333	3	10603 11101 / 10601	2-2	F O D	Signalized IS Analysis
88 (10603)	-3167	333	3	11001 10602 / 10601	2-2	F X A	10601-10602 delays
89 (10902)	-3169	332	3	21301 11001 / 10901	2-2	D X A	10901-11001 delays
90 (7802)	11-32	433	3	7801 2703 / 804	4-2	F X B	804-2703 delays
91 (804)	-3196	433	4	803 1701 / 7802 5903	2-2	A X A A,A	
92 (1602)	-3004	437	4	1201 1301 / 1701 1601	2-2	A X A A,A	
93 (1301)	-225	437			Channeli-zation		
94 (6302)	21-3017	435	4	7202 6303 / 7203 6301	2-2	C,A X D,A A,A	
95 (6303)	-3333	435	4	6302 7202 / 6301 6305	2-2	C X A A,A	
96 (6305)	-(IM9)	435	3	6402 6303 / 6002	2-2	C X A	
97 (6402)	-205	435	4	6002 6201 / 6305 6401	2-2	D X C A,A	6401-6201 delays
98 (6201)	A.Chai Badan	435			Municipal Area		
99 (6202)	-2321	435	3	6203 6201 / 6501	2-2	A X A	
100 (6203)	-2219	435	3	20804 6202 / 6503	2-2	A X A	
101 (4203)	32-309	413	4	4802 4201 / 5001 5302	4-2	F O F C,C	Signalized IS Analysis
102 (5302)	-3063	413	3	4203 5301 / 5101	4-2	F O C	Signalized IS Analysis

(7)

SEQ. NO.	Route No.	DOH Distr. Code	Intersection	Number of Lanes Mjr.-Mir.	Level of Service	Remarks
103 (5301)	32-3062	413	3	5201 5302 / 4202	4-2	F O C D	Signalized IS Analysis
104 (5201)	3267 - 3341	413	4	5701 5301 / 8501 8301	4-2	F,D O F,A C,E	Signalized IS Analysis
105 (8501)	-3027	431	3	5201 8101 / 6101	4-2	D X D	Signalized IS Analysis
106 (8101)	-335	431	3	7801 8102 8501 / 7701 8100	4-2	F X A B	7701-8501 delays
107 (2903)	-3212	433	3 (4)	2902 2703 / 2901	4-2	E X A	2901-2703 delays
108 (17201)	3051 33- 3222	432	4	7301 6704 17002 / 17202	2-2(D)	D X C A,A	17202-17002 delays
109 (17002)	3052 - 3428	432	3 (4)	17201 17001 / 17003	2-2	B X A	
110 (17001)	M.N.Nayok	420			Municipal Area		
111 (17403)	-319	424	3	17101 17402 / 17401	2-2	E O B A	17401-17402 delays
112 (17402)	320 - 3077	424	4		Rotary		
113 (17901)	3072 - (3452)	424	4	17402 17501 / 17801 17401	2-2	B O A	
114 (17501)	-304	424	4	17901 18401 / 17804 18001	2-2(D)	D,A X C,A A,A	17804-18001 delays
115 (18001)	-317	427	3	17501 18101 / 18501	2-2	E X A A	18501-18101 delays
116 (18101)	A.W.Nakhon	420	3		Data N.A.		
117 (17601)	-3068	427	3	17600 18101 / 18200	2-2(D)	A X A	
118 (19502)	34-3256	411	4		IC		
119 (19603)	-3413	411	3	19502 14802 / 19601	4-2	F X D	Signalized IS Analysis

(8)

SEQ. NO.	Route No.	DOH Distr. Code	Intersection	Number of Lanes Mjr.-Mir.	Level of Service	Remarks
120 (303)	35-340		(4)		IC Planned		
121 (12902)	-3242	415	4		Data N.A.		
122 (12901)	M.S.Sakhon	415			Municipal Area		
123 (13102)	-3097	415	3	12901 13201 / 13101	4-2	F O F	Signalized IS Analysis
124 (13201)	M.S.Song'M	415			Municipal Area		
125 (12503)	-3088	335	3	13201 12502 / 12504	4-2	E X A	Signalized IS Analysis
126 (15902)	36- New Hwy.	422	3	15605 19104 / 15602	4-2	E O D E	Signalized IS Analysis
127 (19104)	-331	422	4	15603 19103 / 15902 16004	4-2	C X F A,A	
128 (19103)	-3376	426	3	19104 19106 / 19101	4-2	A X A	
129 (19106)	-3191	426	4	19001 18703 / 19103 19105	4-2	A X B A,A	
130 (18703)	-3138	426	4	18901 18702 / 19106 18701	2-2	A X A A,A	
131 (5901)	A.Ban Mi				Municipal Area		
132 (6002)	205-3326	435	4	6501 6402 / 6001 6305	2-2	A X B A,A	
133 (6401)	-2256	435	3	6403 6402 / 6201	2-2 Channelized	A X A	
134 (6204)	-2272	435	3	6201 6205 / 6206	2-2	A X A	
135 (6205)	-2247	435	3	6204 20503 / 6207	2-2	A X A	
136 (1002)	225-(IM6)	437	3	702 1001 / 1202	2-2	A X A	

(9)

SEQ. NO.	Route No.	DOH Distr. Code	Intersection	Number of Lanes Mjr.-Mir.	Level of Service	Remarks
137 (401)	A.Minburi	421		Municipal Area		
138 (502)	304-(IM22)	421	3	14502 501 / 15001	2-2	F O A	15001-501 delays
139 (14502)	304-314	421	3	502 14501 / 14803	4-4	F O D D	Signalized IS Analysis
140 (14501)	M.Chacheng-sao	421			Municipal Area		
141 (14503)	-314 -315	421	4	14501 15303 / A 14901	2-2	F,A O E,A A,A	Signalized IS Analysis
142 (15303)	-3121	421	4	14601 15302 / 14503 15301	4-2	F O F A,A	Signalized IS Analysis
143 (15302)	-331	421	3	15303 14701 / 15301	4-2	E X A	15301-14701 delays
144 (14701)	-3245	421	4	14601 14702 / 15302 15702	2-2	F O E A,A	15102-14702 delays
145 (14702)	-319	421	3	17803 14701 / 18301	2-2	E X A	18301-14701 delays
146 (17803)	-3281	421	3	17804 14702 / 17802	2-2	A X A	
147 (17804)	-3079	421	3	17501 17803 / 17802	2-2	A X A	
148 (3903)	305-A(IM14) B(IM15)	416	3	3901 17301 / 4002	2-2	F O B	4002-17301 delays
149 (17202)	-3051	416	3 (4)	17003 17301 / 17201	2-2	C X A	
150 (17003)	-3428	416	3	17001 17202 / 17002	2-2	D X A	17002-17202 delays
151 (4201)	M.Ayutthaya	413			Municipal Area		
152 (4202)	309-3062	413	3	4201 8401 / 5301	2-2	F O B	5301-8401 delays
153 (8301)	M.Ang Thong	413			Municipal Area		

(10)

SEQ. NO.	Route No.	DOH Distr. Code	Intersection	Number of Lanes Mjr.-Mir.	Level of Service	Remarks
154 (8202)	309-3032	431	3		Data N.A.		
155 (7701)	M.Sing Buri	431			Municipal Area		
156 (5801)	311-3196	431	4		Data N.A.		
157 (6101)	-3027	431	3	5801 / 8102 8501	2-2(D)	A X A	
158 (8102)	-3028	431	3	6101 8101 / 5901	2-2	D X A	5901-8101 delays
159 (3001)	-3010	433	3	2702 7701 / 3101	2-2(D)	A X A	
160 (2702)	-3183	433	3	3001 2801 / 2701	2-2	B X A	
161 (14803)	314-(IM17)	421	3	14502 14801 / 601	4-2	E X A	601-14801 delays
162 (15702)	315-3127	422	3	15501 15403 / 15701	2-2	B X A A	
163 (15501)	3246 - 3345	422	4	14902 15502 15802 / 15702	4-2(D)	E,A X E,A A,A	
164 (14902)	-3127	422	3	14901 15501 / 15701	Municipal Area	F O A	15701-15501 delays
165 (19801)	M.Chantha Buri	423			2-2	A A	
166 (20201)	317-3277	423	3	20202 20301	2-2	A X A	
167 (20301)	-3193	423	3	20201 20304 / 20302	2-2	A X A	
168 (20304)	-3193	423	3	20301 18502 / 20303	2-2	B X A	
169 (18502)	-3067	427	3	20304 18501 / 18601	2-2	A X A	
170 (16502)	318-3271	425	3	16801 16501 / 16503	2-2	A X A	

(11)

SEQ. NO.	Route No.	DOH Distr. Code	Intersection		Number of Lanes Mjr.-Mir.	Level of Service	Remarks
171 (17401)	M.Pra'buri	424			Municipal Area		
172 (18301)	319-3070	424	3	17401 / 14702 17802	2-2(D)	A X A	
173 (10403)	321-3297	415	3	10003 10401 / 10501	2-2	C X A	
174 (10401)	( ) -3035	415	4	10402 10502 / 9203 10403	2-2(D)	E O F A,A	9203-10403 10502-10402 delays
175 (10402)	-3040	414	3	13603 10401 / 9203	2-2	C X A	
176 (13603)	-3260 -3387	414	4	13601 10402 / 13604 13605	2-2	A X C A,A	
177 (13604)	-3356	414	3	14103 13603 / 13605	2-2	C X A	
178 (14103)	-324	414	3	9302 14102 / 13604	2-2	B X A A	
179 (14102)	-3342	414	3	14101 14103 / 9401	2-2	A X A	
180 (14101)	-3230	414	3	13504 14102 / 9904	2-2	A X A	
181 (13504)	-3318	414	3	14101 13503 / 13505	2-2	A X A	
182 (13503)	-322	414	3	14201 13501 / 13504	2-2	D X A A	13504-13501 delays
183 (14201)	A.Don Chedi	414			Municipal Area		
184 (12102)	323-( )	412	3		Old road		
185 (12101)	-3089	412	3	12105 12102 / 12106	4-2	D O D	Signalized IS Analysis
186 (9201)	-3209	412	3	9202 12105 / 9204	4-2	F O B	9204-12105 delays
187 (9202)	-3081	412	3	9201 9101 / 9203	4-2	E O C	Signalized IS Analysis

(12)

SEQ. NO.	Route No.	DOH Distr. Code	Intersection		Number of Lanes Mjr.-Mir.	Level of Service	Remarks
188 (9101)	323-3084	412	3	9202 9001 / 9002	4-2	E X A	9002-9001 delays
189 (9001)	-324	412	3	9101 9003 / 9002	4-2(D)	E O A A	Kanchanaburi municipal traffic dominant
190 (9003)	323 323- 3398	412	4		Data N.A.		
191 (9004)	-3086 3199	412	3	9003 9701 / 9005	2-2	A X A	
192 (9501)	-3343	412	3	9601 9003 / 9500	2-2	A X A	
193 (9002)	324-3084	412	3	9001 9301 / 9101	2-2	A X A	
194 (9301)	-( )	412	3	9002 9302 / 9203	2-2(D)	A X A	
195 (9302)	-3358	414	3	9301 14103 / 13605	2-2	A X A	
196 (12402)	325-3236	335	3 (4)	12301 12401 / 13103	2-2	A X A	
197 (16004)	331-332	422	4	19104 19102 / 16002 16003	2-2	B X A A,A	
198 (15603)	-3241	422	3	15604 19104 / 15605	2-2	A X A	
199 (15604)	-3138	422	3	15603 15801 / 19002	2-2	B X A A	
200 (16202)	-344	422	4	16203 16201 / 15802 15604	4-2	D X F A,A	16203-15802 delays
201 (16203)	-3401	421	3 (4)	16202 16302 / 16204	2-2	A X A	
202 (16302)	-3284 3340	421	4	15502 15503 / 16203 16301	2-2	B X B A,A	
203 (15503)	-3246 3341	421	3 (4)	15301 16302 / 15502	2-2	B X A	
204 (15301)	-3121	421		15302 15503 / 15303	2-2	B X A	

(13)

SEQ. NO.	Route No.	DOH Distr. Code	Intersection		Number of Lanes Mjr.-Mir.	Level of Service	Remarks
205 (1901)	M.U.Thani	436			Municipal Area		
206 (306)	338-340	415	4		IC Planned		
207 (10204)	-3414	415	3	10202 306 / 10203	4-2	F O C D	10203-306 delays
208 (10202)	-3094	415	3	10102 10204 / 10201	4-2	F O A B	10201-10204 delays
209 (304)	340-3242	415	4	301 303 / 305 12902	4-2	F O F F,D	Signalized IS Analysis
210 (3401)	-3215	416	4	3600 3802 / 306 3501	4-2	B,D O F,C E,F	Signalized IS Analysis
211 (3802)	-3035	416	4	10301 5401 / 3401 3801	2-2	F O F A,B	Signalized IS Analysis
212 (5401)	-3422	414	4	5400 3802 / 5602 10302	2-2	F X A A,A	10302-3802 delays
213 (5602)	-3263	413	3	5401 13801 / 5601	2-2	E O A	5601-5401 -13801 delays
214 (15801)	344-3138	422	3	15404 15802 / 15604	4-2	E O C E	Signalized IS Analysis
215 (15802)	-3345	422	3	16202 15801 / 15501	2-2	F O C B	15501-15801 delays
216 (16201)	-3245	422	4	16204 19201 / 16202 19002	2-2	D X D A,A	Signalized IS Analysis
217 (1401)	1072-3013	437	3	2301 1403 / 1402	2-2(D)	A X A	
218 (2101)	1090-3011 3013	436	3 (4)	2001 2102 / 2501	2-2	A X A	
219 (2501)	-3282	436	3	1403 2101 / 2601	2-2(D)	A X A	
220 (1202)	1119-(IM6) 1119	437	4	1203 1002 1301 / 1201	2-2(D)	A X A A,A	
221 (1201)	-3004	437	3	1602 1203 / 1202	2-2(D)	A X A	

(14)

SEQ. NO.	Route No.	DOH Distr. Code	Intersection		Number of Lanes Mjr.-Mir.	Level of Service	Remarks
222 (7402)	2089-2224	432	3	7404 7401 / 7403	2-2	A X A	
223 (7404)	-3224	432	3	6304 7402 / 6701	2-2	A X A	
224 (6304)	-3017	431	3	6403 7404 / 6301	2-2	A X A	
225 (6403)	-2256	435	4	6201 6206 / 5401 6304	2-2	A X A A,A	
226 (6502)	2219-3326	435	3	6003 6503 / 6501	2-2	A X A	
227 (6503)	-(IM7)	435	3	6502 6203 / 6501	2-2	A X A	
228 (6206)	2243-2256	435	4	6204 6207 / 6403 20404	2-2	A X A A,A	
229 (6207)	2247-2256	435	3	20406 6206 / 6205	2-2	A X A	
230 (6501)	2321-3326	435	4	6503 6202 6002 / 6502	2-2(D)	A X A A,A	
231 (703)	3004-3327	437	3	702 1203 / 901	2-2	A X A	
232 (1203)	-1145	437	3 (4)	703 1201 / 1204	2-2	A X A A,A	
233 (1601)	-3004 3330	437	3	1302 1701 / 1602	2-2(D)	A X A	
234 (2102)	3011-3213	436	3	2402 2102 / 2801	2-2	A X A	
235 (2402)	-3211	436	3	3201 2401 / 2102	2-2	A X A	
236 (2401)	-3230 3282	436	3 (4)	14301 2601 / 2402	2-2(D)	A X A	
237 (2201)	3013-3319 3221	436	4	2301 1102 1902 / 2101	2-2(D)	A X A A,A	
238 (7202)	3017-3302 3333	431	4		2-2(D)	A X A A,A	

(15)

SEQ. NO.	Route No.	DOH Distr. Code	Intersection		Number of Lanes Mjr.-Mir.	Level of Service	Remarks
239 6301	3017-3333		3		Data N.A.		
240 4401	3022-3267	431	3 (4)		2-2(D)	B X A	
241 7101	3034-3048	431	4		Data N.A.		
242 7901	3030-(IM11)	431	4	7902 / 7900 / 8001 / 7701	2-2	A X A A,A	
243 8001	3032-(IM11)	431	4	14004 / 7901 / 8701 / 8201	2-2(D)	A X A A,A	
244 14004	-3303	431	3	14003 / 7902 / 8001	2-2	A X A	
245 14003	-3064	431	3	14002 / 14004 / 8801	2-2	A X A	
246 14002	-3039		3	14001 / 13701 / 14003	2-2	A X A	
247 10301	3035-3296	415	3		- A.Bang Len		
248 10502	-3036	415	3	10401 / 10301 / 10501	2-2	D X A	
249 10501	3036-3296 3297	415	3	10403 / 10502 / 10101	2-2(D)	C X A A	
250 13901	3038-3039	414	3	14001 / 13502 / 14201	2-2(D)	E O A	internal traffic dominant
251 13502	3039-3195		3	13501 / 13901 / 8601	2-2	E O C B	8601-13901 delays
252 14001	-(IM3)	414	3	14002 / 13901 / 14401	2-2(D)	B X A	
253 13701	-3039	414	3	3102 / 14002 / 13702	2-2(D)	A X A	
254 3102	-3039	433	3	3101 / 13701 / 3201	2-2	A X A	
255 3101	-3251	433	3		Data N.A.		

(16)

SEQ. NO.	Route No.	DOH Distr. Code	Intersection		Number of Lanes Mjr.-Mir.	Level of Service	Remarks
256 (9203)	3040-3081 3356	414	4	9202 / 19301 / 10401 / 13605	2-2	A X E A,A	19301-9202 delays
257 (8702)	3064-3195	413	4		Data N.A.		
258 (8701)	-IM11	413	3		Data N.A.		
259 (18601	3067-3395	427	4	18502 / 18101 / 20303 / 17601	2-2(D)	A X A A,A	
260 (17801)	3069-3078	424	3	17901 / 17802 / 17401	2-2(D)	A X A	
261 (17802)	3070-3079 3281	424	4	17801 / 17804 / 18301 / 17803	2-2(D)	A X A A,A	
262 (9005)	3086-3398	412	3	9004 / 9401 / 9003	2-2	A X A	
263 (9401)	-3342	414	3	9005 / 9402 / 14102	2-2(D)	A X A	
264 (9402)	-3390	414	3	9401 / 9403 / 9902	2-2	A X A	
265 (9403)	-3306	414	3 (4)	9402 / 14301 / 9902	2-2	A X A	
266 (14301)	-3230	414	4	9403 / 2401 / 14303 / 14302	2-2(D)	A X A A,A	
267 (12601)	3087-3274	335	3	12006 / 12801 / 12602	2-2(D)	A X A	
268 (12801	-3208	335	3	12800 / 12601 / 12802	2-2	A X A	
269 (12504	3088-3093	335	4	12501 / 12701 / 12503 / 13201	2-2(D)	A X C A,A	
270 (12005)	3089-3291	335	3 (4)	12204 / 12003 / 12206	2-2	F O A A	12206-12003 delays
271 (12204)	-3090 3357	335	4	12005 / 12603 / 12201 / 12106	2-2(D)	F O D A,A	Signalized Analysis
272 (12106)	-3273	412	3	12101 / 12204 / 9204	2-2	C X A	

(17)

SEQ. NO.	Route No.	DOH Distr. Code	Intersection		Number of Lanes Mjr.-Mir.	Level of Service	Remarks
273 (13103)	3097-3236	415	3	10002 | 13101 | 12402	2-2	A X A	
274 (4301)	3111-3263	413	3	5601 | 4501 | 4701	2-2(D)	D X A	internal traffic dominant
275 (601)	A.Latkrabang	421		---|---	Municipal Area		
276 (15001)	3124-3200	421	3	502 | 17701 | 14501	2-2(D)	A X A	
277 (19002)	3138-3245	422	4	16201 18901 / 15604 | 19001	2-2	A X A A,A	
278 (16902)	3157-3159	425	3	16901 | 16503 | 16703	2-2	A X A	
279 (16503)	-3271	425	3	16902 16502 / 16501	2-2	A X A	
280 (2801)	3183-3213	436	3	1901 | 2702 | 2102	2-2(D)	A X A	
281 (6701)	3188-3224	432	3	---|---	Data N.A.		
282 (20303)	3193-3395	423	3	20302 | 20304 | 18601	2-2	A X A	
283 (7601)	3196-3267	431	3	4401 | 5701 | 7602	2-2	A X A	
284 (9204)	3209-3273	412	3	12603 | 9201 | 12106	2-2	A X A	
285 (12603)	-3357	412	3	12602 | 9204 | 12204	2-2	A X A	
286 (12602)	-3274	412	3	4001 | 12603 | 12601	2-2	A X A	
287 (1902)	3220-3221 3265	436	3	1901 | 2201 | 1102	2-2	A X A	
288 (1102)	-3319	436	3	2201 | 1101 | 1902	2-2	A X A	
289 (9904)	3230-3264 3306	414	4	9903 / 9901 | 14201 | 14101	2-2	A X A A,A	

(18)

SEQ. NO.	Route No.	DOH Distr. Code	Intersection		Number of Lanes Mjr.-Mir.	Level of Service	Remarks
290 (9903)	3230-	414	3	14303 | 14402 | 9904	2-2	A X A	
291 (14303)	-	414	3	9903 | 14301 | 14401	2-2	A X A	
292 (16301)	3245-3340	421	3 (4)	15103 | 16204 | 16302	2-2(D)	A X A	
293 (16204)	-3401	421	3	16301 | 16201 | 16203	2-2	A X A	
294 (19501)	3256-3268	411	3	19601 | 19303 | 19502	2-2(D)	F X A	internal traffic dominant
295 (13601)	3260-3422	414	3	13603 | 13602 | 10320	2-2(D)	A X A	
296 (4501)	3263-(IM12)	413	3	4601 | 4301 | 4502	2-2	A X A	
297 (9902)	3306-3390	414	3	9901 | 9402 | 9403	2-2	A X A	
298 (4002)	3312-(IM16)	411	3	3903 / 4001 | 15001 / 401	2-2	D O C A	internal traffic dominant
299 (13505)	3318-3351	414	3	13501 | 13602 | 13504	2-2	A X A	
300 (13501)	M.Supan Buri	414		---|---	Municipal Area		
301 (14403)	3350-	414	3	14302 | 13702 | 14401	2-2	A X A	
302 (13605)	3356-3387	414	4	9302 / 9203 | 13604 | 13603	2-2(D)	A X A A,A	
303 (14401)		414	4	14303 14403 14001 / 14402	2-2(D)	A X A A,A	
304 (14402)		414	3	14201 | 9903 | 14401	2-2	A X A	
				---|---			
				---|---			

Appendix 10.3.1 ANALYSIS OF SIGNALIZED INTERSECTIONS

(1)

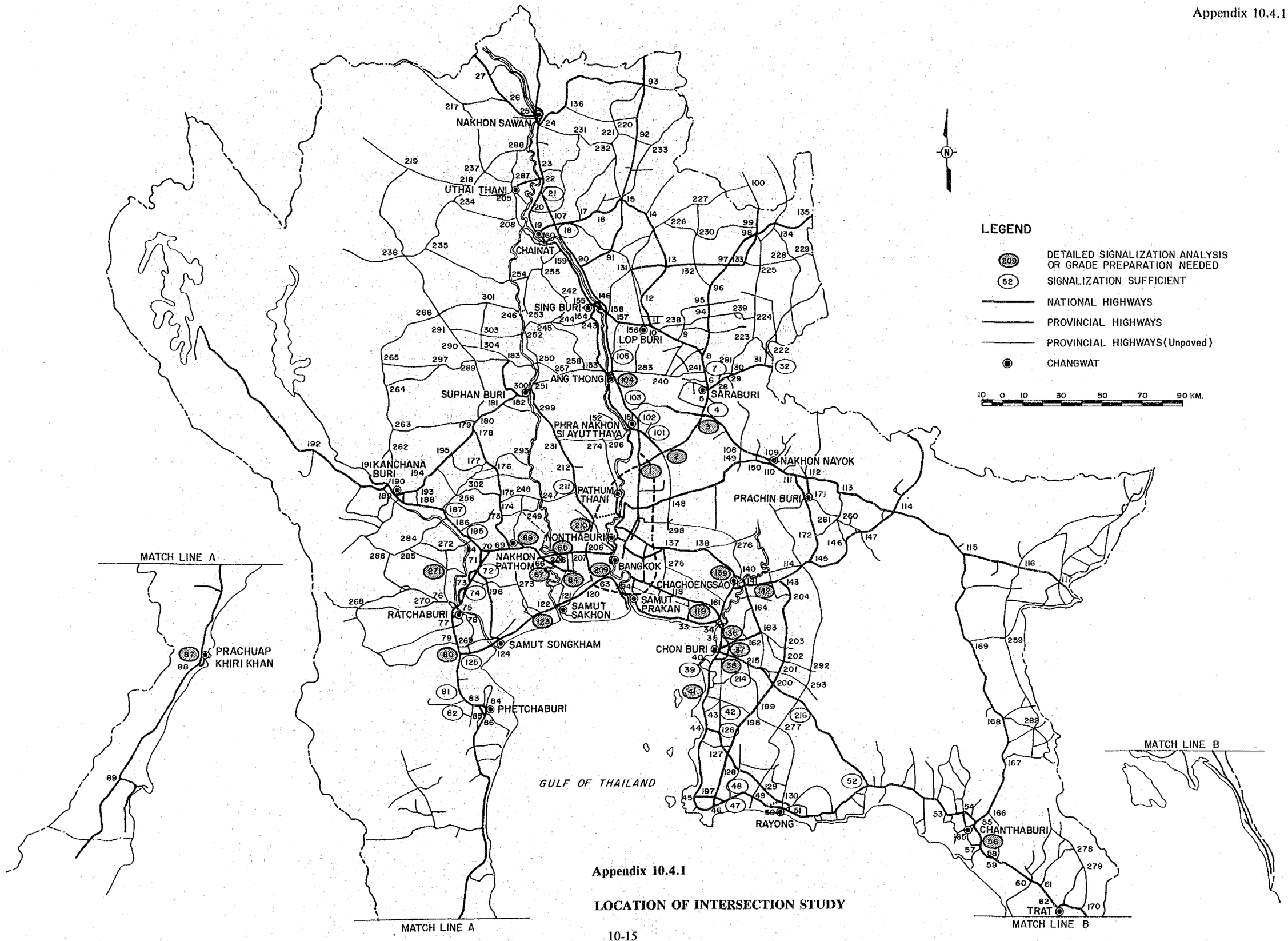
SEQ. NO.	Route No.	DOH Distr. Code	Type of I.S.	Hourly Volume maj./min.	Capacity Level	Remarks
1 (4802)	1-32	413	3	2100/1500—3600	Over	Detailed signalization analysis require
2 (4901)	309-3189	413	4	1200/150—1350	Near	Detailed signalization analysis required
3 (6802)	33-329	430	4	1200/350—1550	Over	Detailed signalization analysis required
4 (6902)	-3041	432	3	1000/20—1020	Under	
7 (6603)	-3048	432	3	600/100—700	Under	
18 (2703)	-32	413	4	750/150—900	Under	
21 (2902)	-32	433	3	700/150—850	Under	
32 (7401)	-2089	432	3	550/130—680	Under	
36 (15402)	3-3	422	3	1100/750—1850	Over	Detailed signalization analysis required
37 (15403)	-315	422	4	1000/300—1300	Near	Detailed signalization analysis required
38 (15404)	-344	422	4	1200/750—1950	Over	Detailed signalization analysis required
39 (15406)	New Hwy.	422	3	800/250—1050	Under	
41 (15601)	-3241	422	(4)	700/600—1300	Near	Detailed signalization analysis required
42 (15605)	New Hwy.-3241	422	4	900/50—950	Under	
47 (19120)	-332	422	3	750/400—1150	Under	
48 (19101)	-3376	426	3	600/400—1000	Under	
52 (18801)	3-344	426	3	500/350—850	Under	

(2)

SEQ. NO.	Route No.	DOH Distr. Code	Type of I.S.	Hourly Volume maj./min.	Capacity Level	Remarks
56 (19803)	-3154	423	3	1000/550—1550	Over	Detailed signalization analysis required
64 (10203)	4-3091-3414	410	4	3000/1300—4300	Over	Detailed signalization analysis required
65 (10201)	-3415	410	3	2100/400—2500	Over	Detailed signalization analysis required
67 (10101)	-3235	410	3	1100/150—1250	Near	Detailed signalization analysis required
68 (10002)	4-4-3097	410	4	1450/1800—3250	Over	Detailed signalization analysis required
72 (12202)	-4-325	410	4	900/300—1200	Under	
74 (12203)	-4	410	3	600/130—730	Under	
80 (12502)	-35	335	3	850/600—1450	Over	Detailed signalization analysis required
81 (11901)	-3349	335	3	600/50—650	Under	
82 (11802)	-3204	335	3	600/100—700	Under	
87 (10602)	-326	333	3	1300/100—1400	Near	Detailed signalization analysis required
101 (4203)	32-309	413		750/250—1000	Under	
102 (5302)	-3063	413	3	600/100—700	Under	
103 (5301)	32-3062	413	3	700/150—850	Under	
104 (5201)	3267-3341	413	4	1100/400—1500	Over	Detailed signalization analysis required
105 (8501)	-3027	430	3	600/100—700	Under	
119 (19603)	-3413	420	3	1500/150—1650	Over	Detailed signalization analysis required

(3)

SEQ. NO.	Route No.	DOH Distr. Code	Type of I.S.	Hourly Volume maj./min.	Capacity Level	Remarks
123 (13102)	35-3097	415	3	1100/400 1500	Over	Detailed signalization analysis required
125 (12503)	-3088	335	3	400/100 500	Under	
126 (15902)	36-New Hwy.	422	3	800/400 1200	Under	
139 (14502)	304-314	421	3	800/450 1250	Near	Detailed signalization analysis required
141 (14503)	314-315	421	4	500/600 1100	Under	
142 (15303)	304-3121	421	4	750/7500 1500	Over	Detailed signalization analysis required
185 (12101)	323-3089	412	3	650/350 1000	Under	
187 (9202)	-3081	412	3	600/350 950	Under	
209 (304)	340-3242	410	4	1700/1450 3150	Over	Detailed signalization analysis required
210 (3401)	-3215	410	4	750/550 1300	Near	Detailed signalization analysis required
211 (3802)	-3035	410	4	550/500 1050	Under	
214 (15801)	344-3138	422	3	700/350 1050	Under	
216 (16201)	-3245	422	4	650/50 700	Under	
271 (12204)	3089-3090-3357	335	4	700/600 1300	Near	Detailed signalization analysis required



Appendix 10.4.1

LOCATION OF INTERSECTION STUDY

Appendix 11.3.1 ECONOMIC RUNNING COSTS BY VOC COMPONENT

Road type and VOC Component	Motor-Cycle	Passenger Car	Light Truck	Medium Truck	Heavy Truck	Light Bus	Medium Bus	Heavy Bus
Free Speed (Kph.)	70	90	80	80	80	80	80	80
Paved (Good Condition)								
Fuel	0.132	0.379	0.355	0.615	0.927	0.355	0.615	0.843
Oil	0.003	0.016	0.021	0.033	0.044	0.021	0.033	0.044
Tyres	0.012	0.064	0.098	0.357	0.622	0.098	0.357	0.447
Maintenance	0.084	0.401	0.269	0.327	0.383	0.237	0.327	0.338
Total	0.231	0.860	0.743	1.333	1.976	0.711	1.333	1.672
Free Speed (Kph.)	55	60	60	55	55	60	55	60
Laterite (Good Condition)								
Fuel	0.132	0.392	0.383	0.582	0.936	0.383	0.582	0.835
Oil	0.003	0.019	0.030	0.044	0.058	0.030	0.044	0.058
Tyres	0.019	0.104	0.158	0.576	1.006	0.158	0.576	0.723
Maintenance	0.157	0.768	0.516	0.633	0.744	0.452	0.633	0.655
Total	0.311	1.283	1.087	1.835	2.744	1.023	1.835	2.270
Free Speed (Kph.)	30	25	30	30	30	30	30	30
Laterite (Poor Condition)								
Fuel	0.145	0.582	0.547	0.806	1.397	0.547	0.806	1.280
Oil	0.006	0.032	0.042	0.064	0.088	0.042	0.064	0.088
Tyres	0.044	0.225	0.341	1.242	2.191	0.341	1.242	1.599
Maintenance	0.325	1.546	1.044	1.266	1.476	0.916	1.266	1.309
Total	0.520	2.385	1.974	3.377	5.153	1.846	3.377	4.276

Appendix 11.3.2 ECONOMIC FIXED COSTS BY VOC COMPONENT

Road type and VOC Component	Motor-Cycle	Passenger Car	Light Truck	Medium Truck	Heavy Truck	Light Bus	Medium Bus	Heavy Bus
Average Speed (km)	55	70	60	60	60	60	60	60
Paved (Good Condition)								
Capital	0.324	0.893	0.915	1.250	1.674	0.815	1.283	1.361
Overheads				1.628	1.617	0.778	1.535	1.888
Insurance								
Total	0.324	0.893	0.915	2.878	3.291	1.592	2.818	3.249
Laterite (Good Condition)								
Capital	0.424	1.305	1.227	1.718	2.299	1.093	1.618	1.707
Overheads				1.929	1.909	0.871	1.701	2.105
Insurance								
Taxes								
Total	0.424	1.305	1.227	3.647	4.207	1.965	3.319	3.812
Average Speed (km)	30	25	30	30	30	30	30	30
Laterite (Poor Condition)								
Capital	0.636	2.254	1.774	2.734	3.660	1.584	2.812	2.968
Overheads				2.333	2.312	1.109	2.188	2.696
Insurance								
Taxes								
Total	0.636	2.254	1.774	5.067	5.972	2.694	5.000	5.664

Appendix 11.3.2 ADDITIONAL COSTS FOR GRADIENTS, CURVES AND SPEED CHANGES

MOTORCYCLE, PASSENGER CAR, LIGHT BUS & PICKUP TRUCK

Road Class	Gradient 1/			Curve 2/			Speed Change 3/	
	Good	Fair	Poor	Good	Fair	Poor	Narrow Bridge	Wooden Bridge
1	-	11.19	30.04	6.98	28.97	119.40	-	-
2	-	11.19	30.04	6.98	28.97	119.40	-	-
3	-	11.19	30.04	6.98	28.97	119.40	98.99	-
4	-	11.36	29.97	4.92	19.14	88.22	74.14	85.32
5	-	11.53	29.17	3.01	12.36	48.88	43.59	54.66
5	-	11.29	26.26	2.58	8.54	25.98	20.75	31.25
7	-	11.08	24.33	2.38	7.44	19.26	9.78	19.30

HEAVY BUS & 6-WHEEL TRUCK

Road Class	Gradient 1/			Curve 2/			Speed Change 3/	
	Good	Fair	Poor	Good	Fair	Poor	Narrow Bridge	Wooden Bridge
1	-	21.52	-	9.05	39.15	118.18	-	-
2	-	21.52	-	9.05	39.15	118.18	-	-
3	-	21.52	-	9.05	39.15	118.18	119.47	-
4	-	19.98	41.94	5.78	26.87	116.16	92.94	107.52
5	-	17.44	42.20	4.08	14.42	66.49	57.74	72.61
5	-	15.01	41.05	3.71	12.48	34.86	29.12	43.63
7	-	12.71	32.68	3.53	10.49	26.84	14.26	27.66

MEDIUM BUS & 4-WHEEL TRUCK

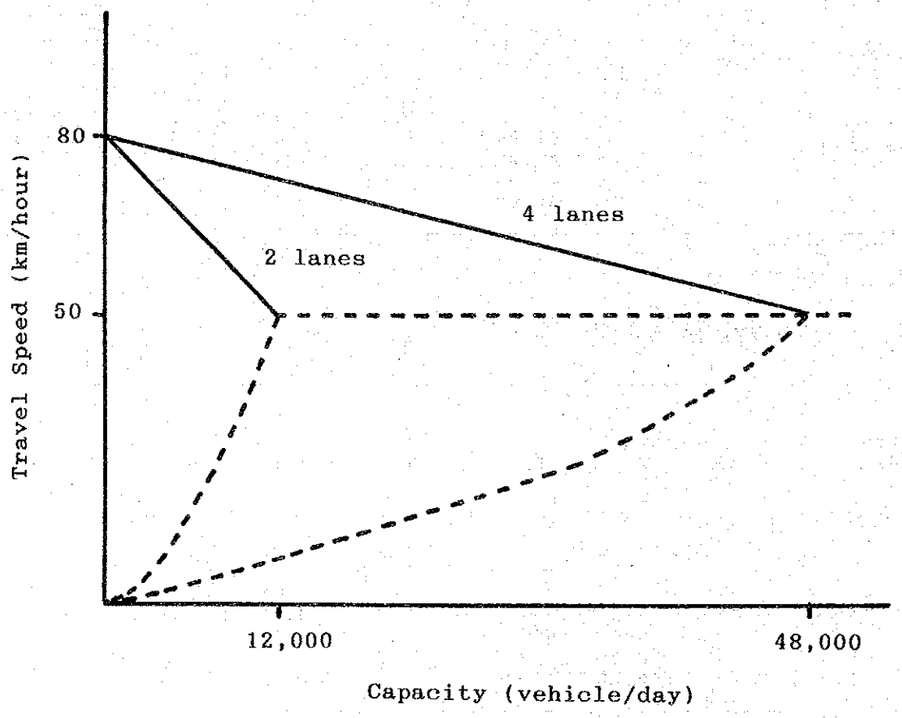
Road Class	Gradient 1/			Curve 2/			Speed Change 3/	
	Good	Fair	Poor	Good	Fair	Poor	Narrow Bridge	Wooden Bridge
1	-	12.51	35.27	7.53	29.99	124.71	-	-
2	-	12.51	35.27	7.53	29.99	124.71	-	-
3	-	12.51	35.27	7.53	29.99	124.71	99.00	-
4	-	11.88	32.34	5.68	23.80	94.36	75.46	87.97
5	-	10.97	30.02	3.79	14.39	50.40	44.85	56.59
5	-	9.99	26.65	2.93	9.15	27.20	21.55	32.04
7	-	9.30	23.92	2.68	7.65	20.85	10.45	19.70

10-WHEEL TRUCK

Road Class	Gradient 1/			Curve 2/			Speed Change 3/	
	Good	Fair	Poor	Good	Fair	Poor	Narrow Bridge	Wooden Bridge
1	-	18.65	-	18.12	78.38	234.20	-	-
2	-	18.65	-	18.12	78.38	234.20	-	-
3	-	18.65	-	18.12	78.38	234.20	375.79	-
4	-	25.21	-	11.39	55.32	172.31	294.00	331.57
5	-	29.74	57.69	7.89	27.99	120.29	192.93	222.26
5	-	26.02	56.94	6.96	23.42	65.35	90.06	128.71
7	-	22.26	49.39	6.44	18.97	49.20	49.26	79.11

1/ : % of level tangent cost/km
2/ : % of level tangent cost/km
3/ : % of level tangent cost/bridge

Appendix 11.3.4 RELATIONSHIP BETWEEN TRAVEL SPEED AND CAPACITY



Appendix 12.2.1 AXLE LOAD EQUIVALENCY FACTORS FOR FLEXIBLE PAVEMENT

SINGLE AXLE AND PT OF 2.0

Axle Load (kips)	Pavement Structural Number (SN)					
	1	2	3	4	5	6
2	.0002	.0002	.0002	.0002	.0002	.0002
4	.002	.003	.002	.002	.002	.002
6	.009	.012	.011	.010	.009	.009
8	.030	.035	.036	.033	.031	.029
10	.075	.085	.090	.085	.079	.076
12	.165	.177	.189	.183	.174	.168
14	.325	.338	.354	.350	.338	.331
16	.589	.598	.613	.612	.603	.596
18	1.00	1.00	1.00	1.00	1.00	1.00
20	1.61	1.59	1.56	1.55	1.57	1.59
22	2.49	2.44	2.35	2.31	2.36	2.41
24	3.71	3.62	3.43	3.33	3.40	3.51
26	5.36	5.21	4.88	4.68	4.77	4.96
28	7.54	7.31	6.78	6.42	6.52	6.83
30	10.4	10.0	9.2	8.6	8.7	9.2
32	14.0	13.5	12.4	11.5	11.5	12.1
34	18.5	17.9	16.3	15.0	14.9	15.6
36	24.2	23.3	21.2	19.3	19.0	19.9
38	31.1	29.9	27.1	24.6	24.0	25.1
40	39.6	38.0	34.3	30.9	30.0	31.2
42	49.7	47.7	43.0	38.6	37.2	38.5
44	61.8	59.3	53.4	47.6	45.7	47.1
46	76.1	73.0	65.6	58.3	55.7	57.0
48	92.9	89.1	80.0	70.9	67.3	68.6
50	113.	108.	97.	86.	81.	82.

TANDEM AXLES AND PT OF 2.0

Axle Load (kips)	Pavement Structural Number (SN)					
	1	2	3	4	5	6
2	.0000	.0000	.0000	.0000	.0000	.0000
4	.0003	.0003	.0003	.0002	.0002	.0002
6	.001	.001	.001	.001	.001	.001
8	.003	.003	.003	.003	.003	.002
10	.007	.008	.008	.007	.006	.006
12	.013	.016	.016	.014	.013	.012
14	.024	.029	.029	.026	.024	.023
16	.041	.048	.050	.046	.042	.040
18	.066	.077	.081	.075	.069	.066
20	.103	.117	.124	.117	.109	.105
22	.156	.171	.183	.174	.164	.158
24	.227	.244	.260	.252	.239	.231
26	.322	.340	.360	.353	.338	.329
28	.447	.465	.487	.481	.466	.455
30	.607	.623	.646	.643	.627	.617
32	.810	.823	.843	.842	.829	.819
34	1.06	1.07	1.08	1.08	1.08	1.07
36	1.38	1.38	1.38	1.38	1.38	1.38
38	1.76	1.75	1.73	1.72	1.73	1.74
40	2.22	2.19	2.15	2.13	2.16	2.18
42	2.77	2.73	2.64	2.62	2.66	2.70
44	3.42	3.36	3.23	3.18	3.24	3.31
46	4.20	4.11	3.92	3.83	3.91	4.02
48	5.10	4.98	4.72	4.58	4.68	4.83
50	6.15	5.99	5.64	5.44	5.56	5.77
52	7.37	7.16	6.71	6.43	6.56	6.83
54	8.77	8.51	7.93	7.55	7.69	8.03
56	10.4	10.1	9.3	8.8	9.0	9.4
58	12.2	11.8	10.9	10.3	10.4	10.9
60	14.3	13.8	12.7	11.9	12.0	12.6
62	16.6	16.0	14.7	13.7	13.8	14.5
64	19.3	18.6	17.0	15.8	15.8	16.6
66	22.2	21.4	19.6	18.0	18.0	18.9
68	25.5	24.6	22.4	20.6	20.5	21.5
70	29.2	28.1	25.6	23.4	23.2	24.3
72	33.3	32.0	29.1	26.5	26.2	27.4
74	37.8	36.4	33.0	30.0	29.4	30.8
76	42.8	41.2	37.3	33.8	33.1	34.5
78	48.4	46.5	42.0	38.0	37.0	38.6
80	54.4	52.3	47.2	42.5	41.3	43.0
82	61.1	58.7	52.9	47.6	46.0	47.8
84	68.4	65.7	59.2	53.0	51.2	53.0
86	76.3	73.3	66.0	59.0	56.8	58.6
88	85.0	81.6	73.4	65.5	62.8	64.7
90	94.4	90.6	81.5	72.6	69.4	71.3

Appendix 12.2.2 CUMULATIVE NUMBER OF ESA (1)

ROUTE RH-1

ESA Conversion Factor

MT	HT	HB
0.63	1.58	0.6

ESA 8.2 Ton Cumulative Number — Unit:1000

	MT		HT		HB		Total ESA	
Year	Vehicles / Day	ESA	Vehicles / Day	ESA	Vehicles / Day	ESA	Total	Per Lane
1990	236	54	136	78	135	30	162	81
1991	247	111	142	160	142	61	332	166
1992	258	170	148	246	150	94	510	255
1993	270	232	155	335	159	128	695	348
1994	281	297	161	428	167	165	890	445
1995	293	364	168	525	176	203	1092	546
1996	305	435	175	626	185	244	1305	653
1997	317	507	182	731	194	286	1524	762
1998	330	583	190	840	204	331	1754	877
1999	344	662	198	954	214	378	1994	997
2000	358	745	206	1073	225	427	2245	1123
2001	373	831	215	1197	237	479	2507	1254
2002	388	920	223	1326	249	534	2780	1390
2003	404	1013	233	1460	262	591	3064	1532
2004	421	1110	242	1600	275	651	3361	1681
2005	438	1210	252	1745	289	715	3670	1835
2006	456	1315	263	1897	304	781	3993	1997
2007	475	1424	274	2055	320	851	4330	2165
2008	495	1538	285	2219	336	925	4682	2341

ROUTE RH-2

ESA Conversion Factor

MT	HT	HB
0.63	1.58	0.6

ESA 8.2 Ton Cumulative Number — Unit:1000

	MT		HT		HB		Total ESA	
Year	Vehicles / Day	ESA	Vehicles / Day	ESA	Vehicles / Day	ESA	Total	Per Lane
1990	382	88	41	24	169	37	149	75
1991	399	180	42	48	178	76	304	152
1992	418	276	44	73	188	117	466	233
1993	436	376	46	100	199	161	637	319
1994	454	480	48	127	209	207	814	407
1995	472	589	50	156	220	255	1000	500
1996	492	702	52	186	231	305	1193	597
1997	512	820	54	217	243	359	1396	698
1998	533	942	56	250	255	414	1606	803
1999	554	1070	59	284	268	473	1827	914
2000	577	1202	61	319	281	535	2056	1028
2001	601	1341	64	356	295	599	2296	1148
2002	626	1485	66	394	310	667	2546	1273
2003	652	1634	69	434	326	738	2806	1403
2004	680	1791	72	475	343	814	3080	1540
2005	708	1954	75	518	360	892	3364	1682
2006	737	2123	78	563	379	975	3661	1831
2007	768	2300	81	610	398	1063	3973	1987
2008	800	2484	84	659	419	1154	4297	2149

ROUTE RH-3

ESA Conversion Factor

MT	HT	HB
0.63	1.58	0.6

ESA 8.2 Ton Cumulative Number — Unit:1000

	MT		HT		HB		Total ESA	
Year	Vehicles / Day	ESA	Vehicles / Day	ESA	Vehicles / Day	ESA	Total	Per Lane
1990	364	84	281	162	482	106	352	176
1991	377	170	293	331	507	217	718	359
1992	390	260	306	507	533	333	1100	550
1993	404	353	320	692	561	456	1501	751
1994	421	450	334	885	587	585	1920	960
1995	438	551	348	1085	615	719	2355	1178
1996	456	655	363	1295	643	860	2810	1405
1997	475	765	378	1513	674	1008	3286	1643
1998	495	878	394	1740	705	1162	3780	1890
1999	516	997	411	1977	738	1324	4298	2149
2000	537	1121	429	2224	773	1493	4838	2419
2001	558	1249	447	2482	805	1669	5400	2700
2002	579	1382	466	2751	838	1853	5986	2993
2003	602	1520	485	3031	873	2044	6595	3298
2004	625	1664	505	3322	908	2243	7229	3615
2005	649	1813	527	3626	946	2450	7889	3945
2006	675	1969	549	3942	985	2666	8577	4289
2007	701	2130	571	4272	1025	2890	9292	4646
2008	728	2297	595	4615	1068	3124	10036	5018

ROUTE RH-4

ESA Conversion Factor

MT	HT	HB
0.63	1.58	0.6

ESA 8.2 Ton Cumulative Number — Unit:1000

	MT		HT		HB		Total ESA	
Year	Vehicles / Day	ESA	Vehicles / Day	ESA	Vehicles / Day	ESA	Total	Per Lane
1990	265	61	279	161	110	24	246	123
1991	282	126	300	334	118	50	510	255
1992	300	195	323	520	126	78	793	397
1993	320	268	348	721	134	107	1096	548
1994	347	348	386	943	145	139	1430	715
1995	377	435	429	1191	157	173	1799	900
1996	409	529	476	1465	170	210	2204	1102
1997	444	631	528	1770	184	251	2652	1326
1998	482	742	586	2108	199	294	3144	1572
1999	524	862	650	2483	216	341	3686	1843
2000	568	993	722	2899	234	393	4285	2143
2001	601	1131	767	3341	245	446	4918	2459
2002	637	1278	814	3811	257	503	5592	2796
2003	674	1433	864	4309	269	562	6304	3152
2004	713	1597	918	4839	282	623	7059	3530
2005	755	1770	975	5401	295	688	7859	3930
2006	800	1954	1035	5998	310	756	8708	4354
2007	847	2149	1099	6631	324	827	9607	4804
2008	896	2355	1167	7304	340	901	10560	5280

CUMULATIVE NUMBER OF ESA (2)

ROUTE RH-5

ESA Conversion Factor

MT	HT	HB
0.63	1.58	0.6

ESA 8.2 Ton Cumulative Number — Unit:1000

Year	MT Vehicles / Day	MT ESA	HT Vehicles / Day	HT ESA	HB Vehicles / Day	HB ESA	Total ESA Total	Total ESA Per Lane
1990	591	136	1177	679	871	191	1006	503
1991	627	280	1245	1397	924	393	2070	1035
1992	665	433	1317	2156	979	608	3197	1599
1993	706	595	1393	2960	1037	835	4390	2195
1994	746	767	1460	3802	1077	1070	5639	2820
1995	788	948	1531	4685	1118	1315	6948	3474
1996	833	1140	1605	5610	1161	1570	8320	4160
1997	880	1342	1682	6580	1205	1833	9755	4878
1998	930	1556	1763	7597	1251	2107	11260	5630
1999	983	1782	1848	8663	1299	2392	12837	6419
2000	1038	2021	1937	9780	1349	2687	14488	7244
2001	1086	2270	2003	10935	1398	2994	16199	8100
2002	1137	2532	2072	12130	1448	3311	17973	8987
2003	1190	2805	2143	13366	1500	3639	19810	9905
2004	1246	3092	2217	14644	1554	3979	21715	10858
2005	1304	3392	2293	15967	1610	4332	23691	11846
2006	1365	3706	2371	17334	1668	4697	25737	12869
2007	1429	4034	2452	18748	1728	5076	27858	13929
2008	1495	4378	2537	20211	1791	5468	30057	15029

ROUTE RH-6

ESA Conversion Factor

MT	HT	HB
0.63	1.58	0.6

ESA 8.2 Ton Cumulative Number — Unit:1000

Year	MT Vehicles / Day	MT ESA	HT Vehicles / Day	HT ESA	HB Vehicles / Day	HB ESA	Total ESA Total	Total ESA Per Lane
1990	1760	405	1227	708	113	25	1138	569
1991	1840	828	1282	1447	119	51	2326	1163
1992	1923	1270	1340	2220	126	78	3568	1784
1993	2010	1732	1401	3028	133	108	4868	2434
1994	2093	2213	1459	3869	140	138	6220	3110
1995	2179	2715	1518	4745	147	170	7630	3815
1996	2268	3236	1581	5656	154	204	9096	4548
1997	2362	3779	1646	6606	162	240	10625	5313
1998	2459	4345	1713	7593	170	277	12215	6108
1999	2560	4933	1784	8622	179	316	13871	6936
2000	2665	5546	1857	9693	188	357	15596	7798
2001	2776	6185	1934	10809	198	401	17395	8698
2002	2891	6849	2015	11971	208	446	19266	9633
2003	3011	7542	2098	13180	218	494	21216	10608
2004	3136	8263	2185	14441	229	544	23248	11624
2005	3266	9014	2276	15753	241	597	25364	12682
2006	3402	9796	2371	17120	253	652	27568	13784
2007	3543	10611	2469	18544	266	710	29865	14933
2008	3690	11459	2527	20002	280	772	32233	16117

ROUTE RH-7

ESA Conversion Factor

MT	HT	HB
0.63	1.58	0.6

ESA 8.2 Ton Cumulative Number — Unit:1000

Year	MT Vehicles / Day	MT ESA	HT Vehicles / Day	HT ESA	HB Vehicles / Day	HB ESA	Total ESA Total	Total ESA Per Lane
1990	1611	370	319	184	2	0	554	277
1991	1683	757	333	376	3	1	1134	567
1992	1759	1162	348	577	3	2	1741	871
1993	1838	1585	364	787	3	2	2374	1187
1994	1914	2025	379	1005	3	3	3033	1517
1995	1993	2483	395	1233	3	4	3720	1860
1996	2076	2960	411	1470	3	4	4434	2217
1997	2162	3458	428	1717	4	5	5180	2590
1998	2251	3975	445	1973	4	6	5954	2977
1999	2344	4514	463	2240	4	7	6761	3381
2000	2442	5076	482	2518	4	8	7602	3801
2001	2543	5660	502	2808	4	9	8477	4239
2002	2649	6270	523	3110	4	10	9390	4695
2003	2759	6904	545	3424	5	11	10339	5170
2004	2874	7565	567	3751	5	12	11328	5664
2005	2993	8253	591	4092	5	13	12358	6179
2006	3117	8970	615	4446	5	14	13430	6715
2007	3247	9717	641	4816	6	15	14548	7274
2008	3382	10494	667	5201	6	17	15712	7856

ROUTE RH-8

ESA Conversion Factor

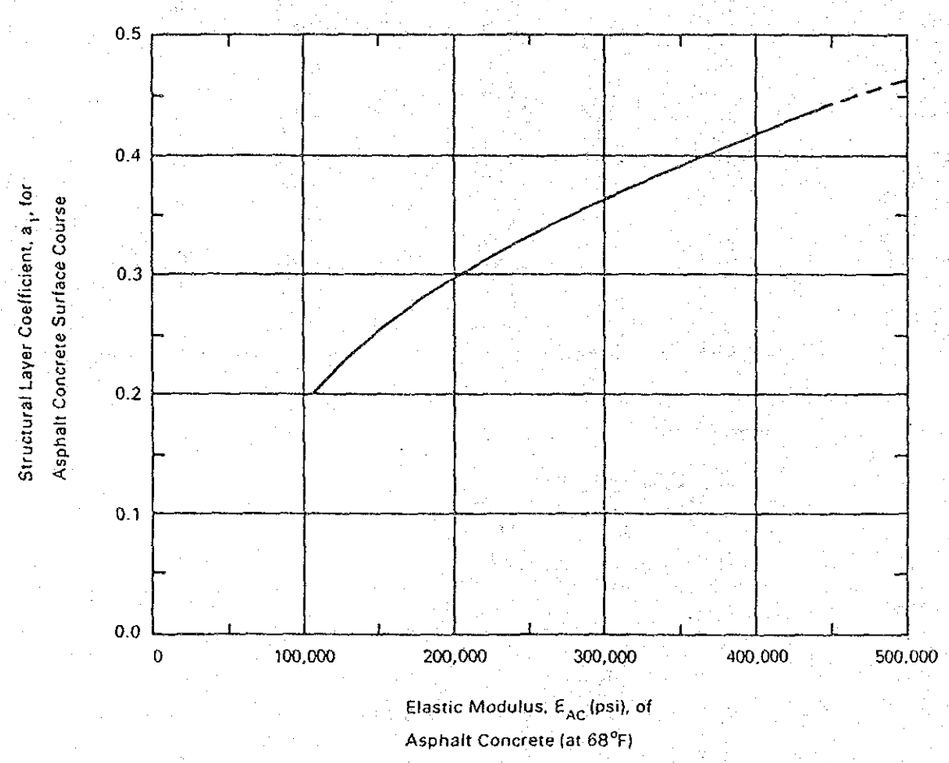
MT	HT	HB
0.63	1.58	0.6

ESA 8.2 Ton Cumulative Number — Unit:1000

Year	MT Vehicles / Day	MT ESA	HT Vehicles / Day	HT ESA	HB Vehicles / Day	HB ESA	Total ESA Total	Total ESA Per Lane
1990	63	14	144	83	95	21	118	59
1991	66	30	151	170	100	43	243	122
1992	69	46	158	261	106	66	373	187
1993	72	62	165	356	112	90	508	254
1994	75	79	172	456	118	116	651	326
1995	78	97	179	559	124	143	799	400
1996	81	116	187	667	130	172	955	478
1997	85	135	195	779	137	202	1116	558
1998	88	156	203	896	144	233	1285	643
1999	92	177	212	1018	151	267	1462	731
2000	96	199	221	1146	159	301	1646	823
2001	100	222	230	1279	167	338	1839	920
2002	104	246	240	1417	175	376	2039	1020
2003	108	271	249	1561	184	417	2249	1125
2004	113	297	260	1710	194	459	2466	1233
2005	118	324	270	1866	204	504	2694	1347
2006	123	352	281	2028	214	551	2931	1466
2007	128	381	293	2197	225	600	3178	1589
2008	133	412	305	2373	236	652	3437	1719

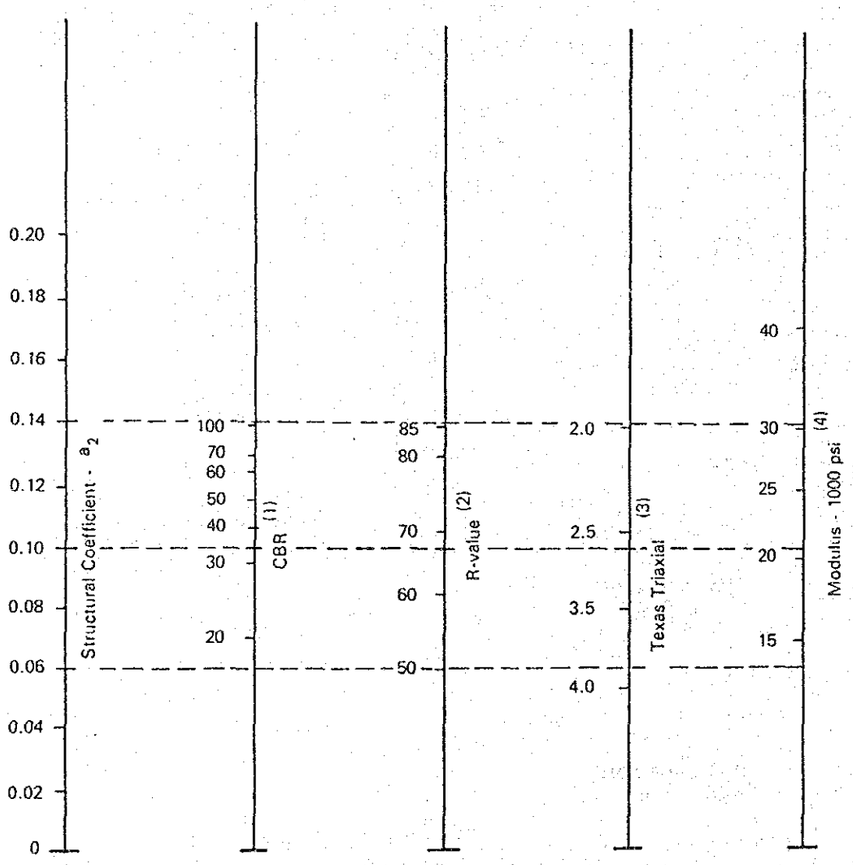
Appendix 12.2.3 CHART FOR ESTIMATING STRUCTURAL LAYER COEFFICIENT (1)

DENSE-GRADED ASPHALT CONCRETE BASED ON ELASTIC MODULUS



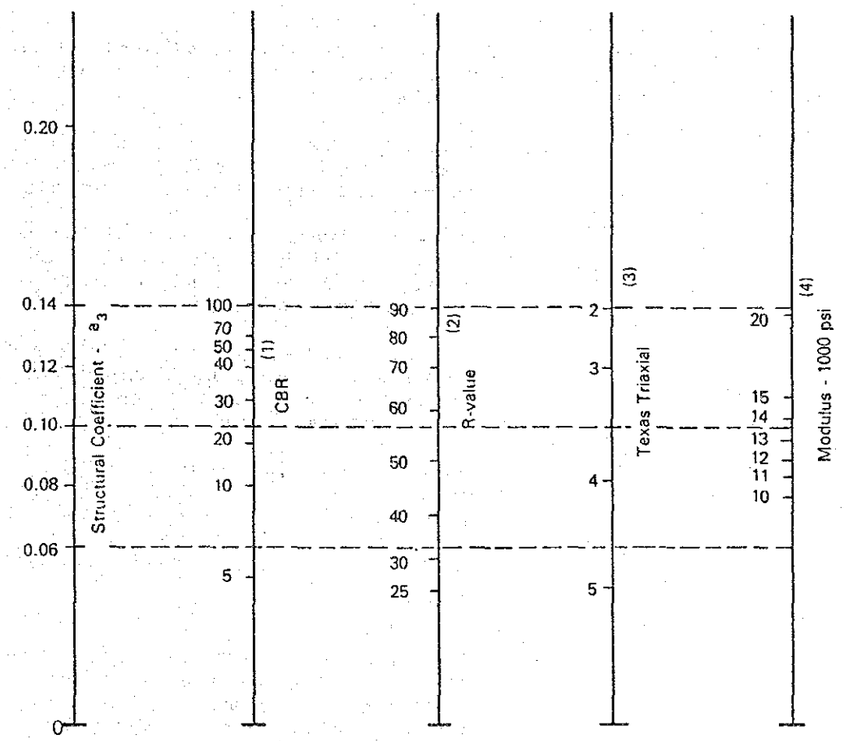
Appendix 12.2.3 CHART FOR ESTIMATING STRUCTURAL LAYER COEFFICIENT (2)

GRANULAR BASE



(1) Scale derived by averaging correlations obtained from Illinois.
(2) Scale derived by averaging correlations obtained from California, New Mexico and Wyoming.
(3) Scale derived by averaging correlations obtained from Texas.
(4) Scale derived on NCHRP project *(3)*.

GRANULAR SUBBASE



(1) Scale derived from correlations from Illinois.
(2) *Scale derived from correlations obtained from The Asphalt Institute, California, New Mexico and Wyoming.*
(3) Scale derived from correlations obtained from Texas.
(4) Scale derived on NCHRP project *(3)*.

Appendix 12.2.4 VISUAL STRUCTURAL CONDITION VALUES (CX)

Layer Type	Pavement Condition	C Struct Cond Factor Value	Remarks
Asphaltic	1. Asphalt layers that are sound, stable, uncracked and have little to no deformation in the wheel paths	.95	
	2. Asphalt layers that exhibit some intermittent cracking with slight to moderate wheel path deformation but are still stable	.85	PSI = 2.5
	3. Asphalt layers that exhibit some moderate to high cracking, have ravelling or aggregate degradation and show moderate to high deformation in wheel path	.70	PSI = 2.0
	4. Asphalt layers that show very heavy (extensive) cracking, considerable ravelling or degradation and very apprecable wheel path deformations	.60	PSI = 1.5
Granular Base/ Subbase	1. Unbound granular layers showing no evidence of shear or desification distress, reasonably identical physical properties as when constructed and existing at the same "normal" moisture-density conditions as when constructed	.95	Deflection >= 0.6 mm
	2. Visible evidence of significant distress within layers (shear or densification), aggregate properties have changed significantly due to abrasion, intrusion of fines from subgrade or pumping, and/or significant change in in situ moisture caused by surface infiltration or other sources	.60	Deflection < 0.6 mm

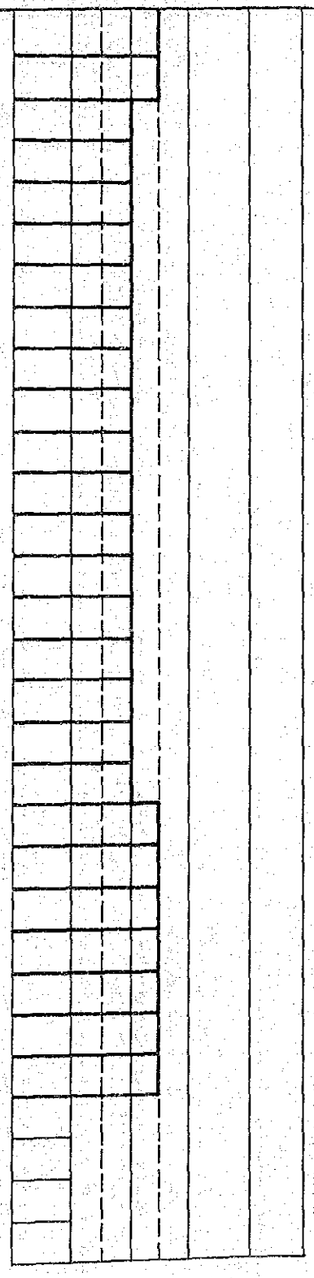
Note: CX values were assumed cresponding to PSI and deflection values of existing pavements

Appendix 12.2.5 RESULT OF OVERLAY & RECONSTRUCTION DESIGN (1)

Existing Pavement Structure	UPM Surface	5 cm
	Crushed Stone Base	15 cm
	Laterite Sub-Base	15 cm

RH-1 (1-1001)

(Km.) - (Km)	Deflection (m.m)	PSI
0 - 1	0.2700	
1 - 2	0.1962	
2 - 3	0.5135	
3 - 4	0.2863	
4 - 5	0.7059	
5 - 6	0.3198	
6 - 7	0.5213	
7 - 8	0.3501	
8 - 9	0.6530	
9 - 10	0.3614	
10 - 11	0.5375	
11 - 12	0.5363	
12 - 13	0.6251	
13 - 14	0.5822	
14 - 15	0.8157	
15 - 16	0.6238	
16 - 17	0.6856	
17 - 18	0.5614	
18 - 19	0.5836	
19 - 20	0.5865	
20 - 21	0.3462	
21 - 22	0.5278	
22 - 23	0.4046	
23 - 24	0.4665	
24 - 25	0.4646	
25 - 25.5		



Overlay Thickness (m-m) AASHTO 1	AASHTO 2	DOH
		-
		-
63	65	0
63	65	0
89	90	0
63	65	0
63	65	0
63	65	0
89	90	0
63	65	0
89	90	0
63	65	0
89	90	0
89	90	0
89	90	0
63	65	0
63	65	0
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-

Remarks

NOTE:

AASHTO 1: Calculated Thickness
2: Adapted Thickness

\- No rehabilitation is required
* Reconstruction is required

Pavement Structure for Reconstruction

RH-1

REQUIRED SN = 2.78

	THICKNESS	SN
A.C.	10 CM.	1.80
BASE	10 CM.	0.52
SUBBASE	15 CM.	0.54
TOTAL	35 CM.	2.86

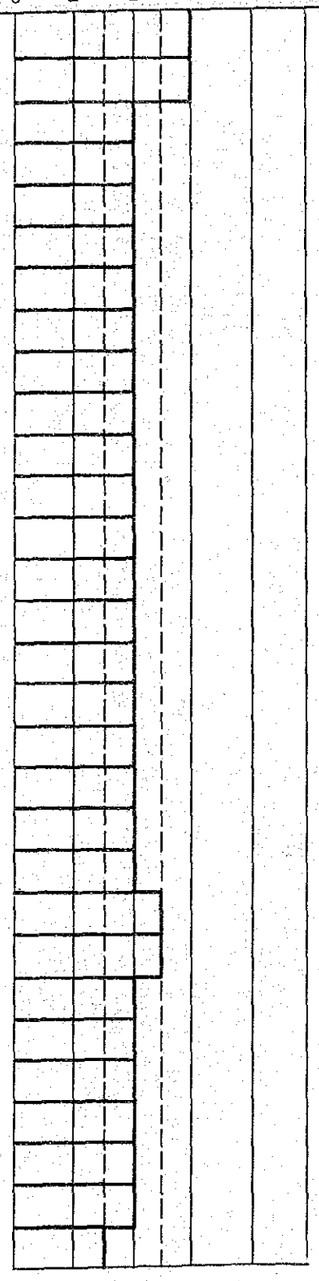
Appendix 12.2.5 RESULT OF OVERLAY & RECONSTRUCTION DESIGN (2)

Existing Pavement Structure

DBST Surface	2.5 cm
Crushed Stone Base	15 cm
Laterite Sub-Base	15 cm

RH-2 (225-0100)

(Km.) - (Km)	Deflection (m.m)	Overlay Thickness (m-m) 1 AASHTO	2	DOH	Remarks
0 - 1	0.41	-	-	-	
1 - 2	0.45	-	-	-	NOTE:
2 - 3	0.30	77	75	0	
3 - 4	0.31	77	75	0	AASHTO 1:Calculated Thickness
4 - 5	0.67	93	75	0	2:Adapted Thickness
5 - 6	0.39	77	75	0	- No rehabilitation is required
6 - 7	0.52	77	75	0	* reconstruction is required
7 - 8	0.32	77	75	0	
8 - 9	0.35	77	75	0	
9 - 10	0.26	77	75	0	
10 - 11	0.37	77	75	0	
11 - 12	0.24	77	75	0	
12 - 13	0.24	77	75	0	
13 - 14	0.26	77	75	0	
14 - 15	0.34	77	75	0	
15 - 16	0.35	77	75	0	
16 - 17	0.48	77	75	0	
17 - 18	0.41	77	75	0	
18 - 19	0.41	77	75	0	
19 - 20	0.29	77	75	0	
20 - 21	0.38	77	75	0	
21 - 22	0.27	-	-	-	
22 - 23	0.24	-	-	-	
23 - 24	0.29	77	75	0	
24 - 25	0.30	77	75	0	
25 - 26	0.45	77	75	0	
26 - 27	0.43	77	75	0	
27 - 28	0.45	77	75	0	
28 - 29	0.51	77	75	0	
19 - 30	0.59	*			



Pavement Structure for Reconstruction

RH-2

REQUIRED SN = 2.75

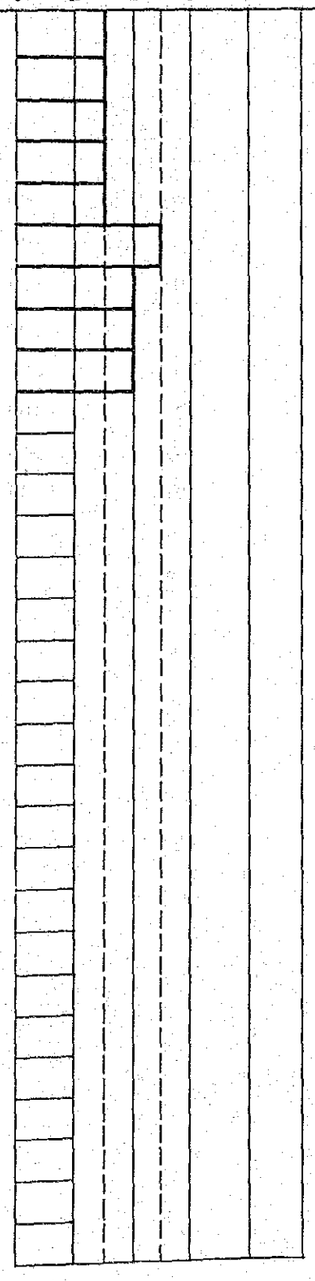
	THICKNESS	SN
A.C.	10 CM.	1.80
BASE	10 CM.	0.52
SUBBASE	15 CM.	0.54
TOTAL	35 CM.	2.86

Appendix 12.2.5 RESULT OF OVERLAY & RECONSTRUCTION DESIGN (3)

Existing Pavement Structure	DBST Surface	2.5cm
	Crushed Stone Base	15 cm
	Laterite Sub-Base	15 cm

RH -2 (225-0100)

(Km.) - (Km)	Deflection (m.m)	PSI 0 1 2 3 4 5	Overlay Thickness (m-m) 1 AASHTO	2 AASHTO	DOH	Remarks
30 - 31	0.46		*			
31 - 32	0.48		*			NOTE:
32 - 33	0.35		*			AASHTO 1:Calculated Thickness
33 - 34	0.31		*			2:Adapted Thickness
34 - 35	0.22		*			
35 - 36	0.28		-			- No rehabilitation is required
36 - 37	0.30		77	75	0	* reconstruction is required
37 - 38	0.27		77	75	0	
38 - 38.3	0.41		77	75	0	



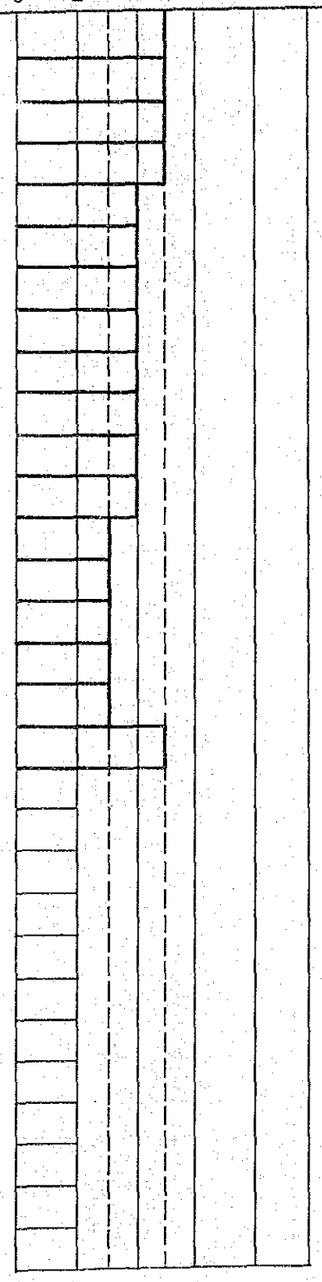
Appendix 12.2.5 RESULT OF OVERLAY & RECONSTRUCTION DESIGN (54)

Existing Pavement Structure

DBST Surface	2.5cm
Crushed Stone Base	15 cm
Laterite Sub-Base	15 cm

RH -3 (325-200)

(Km.) - (Km)	Deflection (m.m)	Overlay Thickness (m-m) 1 AASHTO	2 DOH	Remarks
0 - 1	0.3514	-	-	
1 - 2	0.2905	-	-	NOTE:
2 - 3	0.2881	-	-	AASHTO 1:Calculated Thickness
3 - 4	0.3929	-	-	2:Adapted Thickness
4 - 5	0.2780	98	100 0	
5 - 6	0.3276	98	100 0	- No rehabilitation is required
6 - 7	0.2714	98	100 0	* Reconstruction is required
7 - 8	0.3214	98	100 0	
8 - 9	0.3286	98	100 0	
9 - 10	0.3990	98	100 0	
10 - 11	0.3829	98	100 0	
11 - 12	0.4652	98	100 0	
12 - 13	0.3595	*		
13 - 14	0.3705	*		
14 - 15	0.5005	*		
15 - 16	0.4244	*		
16 - 17	0.5356	*		
17 - 18	0.4879	-	- -	Pavement Structure for Reconstruction



RH-3

REQUIRED SN = 3.11

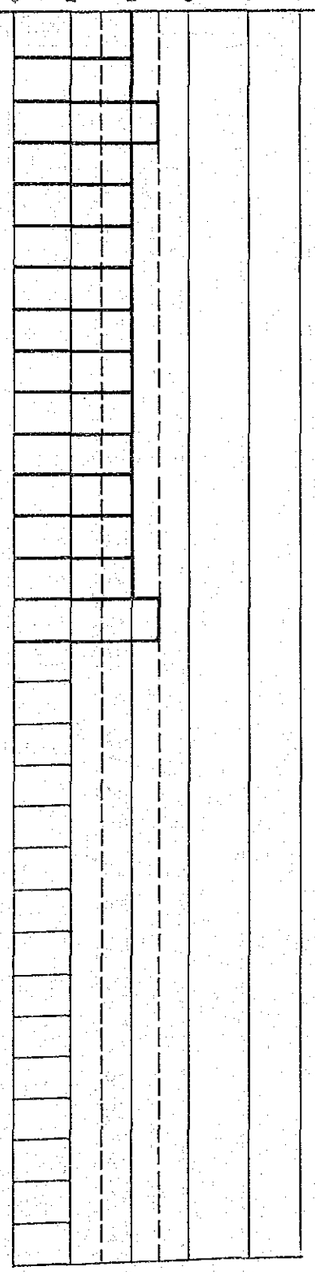
	THICKNESS	SN
A.C.	10 CM.	1.80
BASE	15 CM.	0.78
SUBBASE	15 CM.	0.54
TOTAL	40 CM.	3.12

Appendix 12.2.5 RESULT OF OVERLAY & RECONSTRUCTION DESIGN (5)

Existing Pavement Structure	DBST Surface	2.5cm
	Crushed Stone Base	15 cm
	Laterite Sub-Base	15 cm

RH -4 (332-0100)

(Km.) - (Km)	Deflection (m.m)
0 - 1	0.88
1 - 2	0.62
2 - 3	0.42
3 - 4	0.40
4 - 5	0.50
5 - 6	0.49
6 - 7	0.54
7 - 8	0.54
8 - 9	0.54
9 - 10	0.53
10 - 11	0.48
11 - 12	0.36
12 - 13	0.37
13 - 14	0.45
14 - 15	0.39



Overlay Thickness (m-m) 1 AASHTO	2 AASHTO	DOH
74	75	30
74	75	0
-	-	-
61	60	0
61	60	0
61	60	0
61	60	0
61	60	0
61	60	0
61	60	0
61	60	0
61	60	0
61	60	0
-	-	-

Remarks

NOTE:

AASHTO 1:Calculated Thickness
2:Adapted Thickness

- No rehabilitation is required
* Reconstruction is required

Pavement Structure for Reconstruction

RH-4

REQUIRED SN = 2.30

	THICKNESS	SN
A.C.	5CM.	0.90
BASE	15CM.	0.78
SUBBASE	20CM.	0.72
TOTAL	40CM.	2.40

Appendix 12.2.5 RESULT OF OVERLAY & RECONSTRUCTION DESIGN (6)

Existing Pavement Structure		
	AC Surface	5 cm
	Crushed Stone Base	15 cm
	Laterite Sub-Base	15 cm

RH-5 (344-0200)

(Km.) - (Km)	Deflection (m.m)	PSI 0 1 2 3 4 5	Overlay Thickness (m-m) 1 AASHTO	2	DOH	Remarks
0 - 1	0.4551		-	-	-	
1 - 2	0.4294		-	-	-	
2 - 3	0.3090		-	-	-	
3 - 4	0.2530		*			
4 - 5	0.2179		*			
5 - 6	0.3464		56	55	0	
6 - 7	0.3717		56	55	0	
7 - 8	0.3908		56	55	0	
8 - 9	0.3702		56	55	0	
9 - 10	0.3219		56	55	0	
10 - 11	0.4189		56	55	0	
11 - 12	0.4043		56	55	0	
12 - 13	0.3408		56	55	0	
13 - 14	0.4335		56	55	0	
14 - 15	0.4103		56	55	0	
15 - 16	0.4124		56	55	0	
16 - 17	0.4781		56	55	0	
17 - 18	0.6265		82	80	18	
18 - 19	0.3697		56	55	0	
19 - 20	0.5967		56	55	12	
20 - 21	0.4500		56	55	0	
21 - 22	0.5655		56	55	7	
22 - 23	0.5086		56	55	0	
23 - 24	0.3147		56	55	0	
24 - 25	0.4027		56	55	0	
25 - 26	0.4663		56	55	0	
26 - 27	0.4514		56	55	0	
27 - 28	0.3959		56	55	0	
28 - 29	0.4646		56	55	0	
29 - 30	0.4976		56	55	0	

NOTE:

AASHTO 1:Calculated Thickness
2:Adapted Thickness

- No rehabilitation is required
* Reconstruction is required

Pavement Structure for Reconstruction

RH-5

REQUIRED SN = 2.81

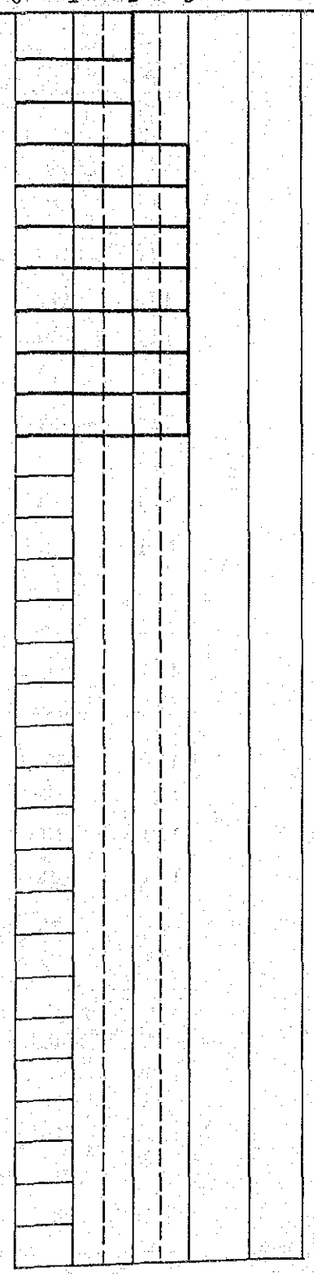
	THICKNESS	SN
A.C.	10 CM.	1.80
BASE	10 CM.	0.52
SUBBASE	15 CM.	0.54
TOTAL	35 CM.	2.86

Appendix 12.2.5 RESULT OF OVERLAY & RECONSTRUCTION DESIGN (7)

Existing Pavement Structure	AC Surface	5 cm
	Crushed Stone Base	15 cm
	Laterite Sub-Base	15 cm

RH-S (344-0200)

(Km.) - (Km)	Deflection (m.m)	PSI 0 1 2 3 4 5	Overlay Thickness (m-m) AASHTO 1	AASHTO 2	DOH
30 - 31	0.4265		56	55	0
31 - 32	0.4259		56	55	0
32 - 33	0.4284		56	55	0
33 - 34	0.5525		-	-	-
34 - 35	0.4976		-	-	-
35 - 36	0.5006		-	-	-
36 - 37	0.4341		-	-	-
37 - 38	0.4371		-	-	-
38 - 39	0.3384		-	-	-
39 - 39.5			-	-	-



Remarks

NOTE:

AASHTO 1:Calculated Thickness
2;Adapted Thickness

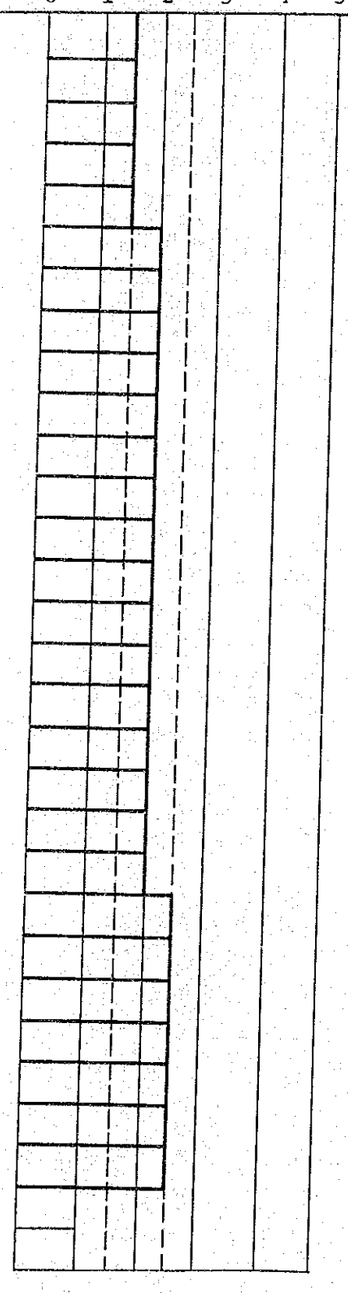
- No rehabilitation is required
* Reconstruction is required

Appendix 12.2.5 RESULT OF OVERLAY & RECONSTRUCTION DESIGN (8)

Existing Pavement Structure	DBST Surface	2.5cm
	Crushed Stone Base	15 cm
	Laterite Sub-Base	15 cm

RH-6 (3089-0100)

(Km.) - (Km)	Deflection (m.m)	PSI 0 1 2 3 4 5	Overlay Thickness (m-m) 1 AASHTO	2 DOH	Remarks
0 - 1	0.29		*		
1 - 2	0.40		*		
2 - 3	0.21		*		
3 - 4	0.34		*		
4 - 5	0.25		*		
5 - 6	0.35		111	110 0	
6 - 7	0.28		111	110 0	
7 - 8	0.39		111	110 0	
8 - 9	0.54		111	110 8	
9 - 10	0.46		111	110 0	
10 - 11	0.34		111	110 0	
11 - 12	0.34		111	110 0	
12 - 13	0.46		111	110 0	
13 - 14	0.40		111	110 0	
14 - 15	0.41		111	110 0	
15 - 16	0.34		111	110 0	
16 - 17	0.39		111	110 0	
17 - 18	0.45		111	110 0	
18 - 19	0.39		111	110 0	
19 - 20	0.50		111	110 0	
20 - 21	0.45		111	110 0	
21 - 22	0.44		111	110 0	
22 - 23	0.39		111	110 0	
23 - 24	0.40		111	110 0	
24 - 25	0.53		111	110 0	
25 - 26	0.53		111	110 0	
26 - 27	0.33		111	110 0	
27 - 27.8	0.45		111	110 0	



NOTE:

AASHTO 1:Calculated Thickness
2:Adapted Thickness

\- No rehabilitation is required
* Reconstruction is required

Pavement Structure for Reconstruction

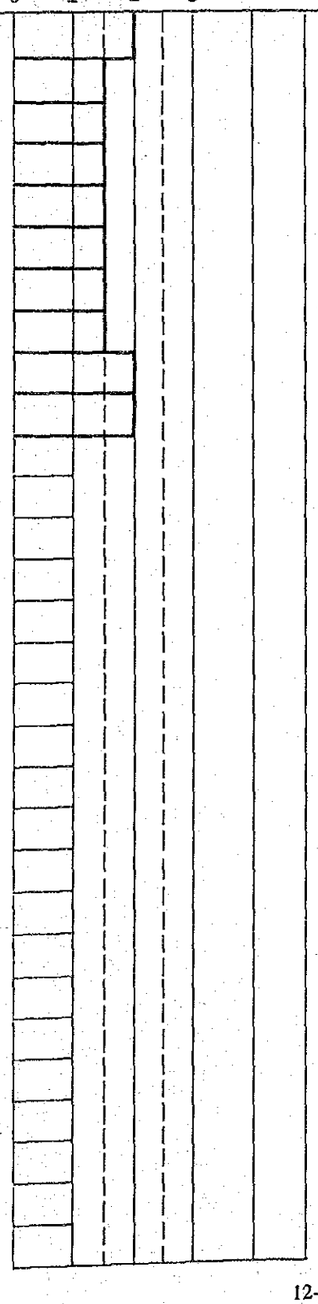
RH - 6

	THICKNESS	SN
A.C.	10 CM.	1.80
BASE	20 CM.	1.04
SUBBASE	15 CM.	0.54
TOTAL	45 CM.	2.38

Appendix 12.2.5 RESULT OF OVERLAY & RECONSTRUCTION DESIGN (9)

Existing Pavement Structure	DBST Surface	2.5cm
	Crushed Stone Base	15 cm
	Laterite Sub-Base	15 cm

RH-7 (3116-0100)

(Km.) - (Km)	Deflection (m.m)	PSI 0 1 2 3 4 5	Overlay Thickness (m-m) 1 AASHTO	2 DOH	Remarks
0 - 1	0.24		146	* 0	
1 - 2	0.68		*		
2 - 3	0.67		*		
3 - 4	1.06		*		
4 - 5	0.58		*		
5 - 6	0.70		*		
6 - 7	0.72		*		
7 - 8	0.74		*		
8 - 9	0.88		146	* 0	
9 - 9.7	0.98		146	* 0	

NOTE:

AASHTO 1:Calculated Thickness
2:Adapted Thickness

- No rehabilitation is required
* Reconstruciton is required

Pavement Structure for Reconstruction

RH-7

REQUIRED SN = 3.51

	THICKNESS	SN
A.C.	10 CM.	1.80
BASE	20 CM.	1.04
SUBBASE	20 CM.	0.72
TOTAL	50 CM.	3.56

Appendix 12.2.5 RESULT OF OVERLAY & RECONSTRUCTION DESIGN (10)

Existing Pavement Structure		
	DBST Surface	2.5cm
	Crushed Stone Base	15 cm
	Laterite Sub-Base	15 cm

RH-8 (3395-0100)

(Km.) - (Km)	Deflection (m.m)	PSI 0 1 2 3 4 5	Overlay Thickness (m-m) 1 AASHTO	2 DOH	Remarks
0 - 1	0.57		45	45 0	
1 - 2	0.62		71	70 0	NOTE:
2 - 3	0.63		*		AASHTO 1:Calculated Thickness
3 - 4	0.63		*		2:Adapted Thickness
4 - 5	0.43		*		
5 - 6	0.55		*		- No rehabilitation is required
6 - 7	0.62		*		* Reconstruction is required
7 - 8	0.82		*		
8 - 9	0.79		*		
9 - 10	0.80		71	70 5	
10 - 11	0.74		71	70 0	
11 - 12	0.69		*		
12 - 13	0.73		*		
13 - 14	0.73		*		
14 - 15	0.75		*		
15 - 16	0.66		*		
16 - 17	0.43		*		
17 - 18	0.61		*		
18 - 19	0.64		*		
19 - 20	0.97		*		
20 - 21	0.87		*		
21 - 22	0.70		*		
22 - 23	0.71		*		
23 - 24	0.75		*		
24 - 25	0.73		*		
25 - 26	0.77		*		
26 - 27	0.88		*		
27 - 28	0.92		*		
28 - 29	0.84		71	70 7	
29 - 30	0.84		71	70 7	

Pavement Structure for Reconstruction

RH-8

REQUIRED SN = 2.18

	THICKNESS	SN
A.C.	5CM.	0.90
BASE	15CM.	0.78
SUBBASE	15CM.	0.54
TOTAL	35CM.	2.22

Appendix 12.2.5 RESULT OF OVERLAY & RECONSTRUCTION DESIGN (11)

Existing Pavement Structure		

RH-8 (3395-0100)

(Km.) - (Km)	Deflection (m.m)	P S I 0 1 2 3 4 5	Overlay Thickness (m-m) 1 AASHTO	2 DOH	Remarks
30 - 31	0.73		*		
31 - 32	0.67		*		NOTE:
32 - 33	0.73		*		
33 - 33.5	0.53		*		AASHTO 1:Calculated Thickness 2:Adapted Thickness
					- No rehabilitation is required
					* Reconstruction is required

Appendix 12.2.6 CONSTRUCTION QUANTITIES AND COSTS FOR OVERLAY & RECONSTRUCTION (1)

PROJECT RH-1

Item	Unit	Financial Unit Rate Baht	Quantity	Financial Total Cost 1000 Baht	Economic Cost %	Economic Cost 1000 Baht	Residual Value %	Residual Value 1000 Baht
					83		50	
Selected Material	m3	180	-	0				
Removal of Existing Pavement Structure	m3	60	-	0				
Subbase Soil Aggregate	m3	220	-	0				
Base Course Crushed Stone	m3	350	-	0				
Asphalt Concrete t=7.5cm	m2	143	66,000	9,438				
Asphalt Concrete t=9.5cm	m2	180	36,000	6,480				
Asphalt Concrete t=10.0cm	m2	190	-	0				
Prime Coat	m2	12	-	0				
Tack Coat	m2	8	139,700	1,118				
Shoulder Soil Aggregate	m3	250	6,180	1,545				
Total (a)				18,581		15,422		7,711
Miscellaneous Work ((a) x 7%)				1,301	83	1,080	0	0
CONTRACT AMOUNT (b)				19,882		16,502		7,711
PHYSICAL CONTINGENCIES ((b) x 10%) (c)				1,988		1,650		771
ENGINEERING AND SUPERVISION (d) (((b) + (c)) x 10%)				2,187	85		0	
PROJECT COST ((b) + (c) + (d))				24,057		18,152		8,482

PROJECT RH-2

Item	Unit	Financial Unit Rate Baht	Quantity	Financial Total Cost 1000 Baht	Economic Cost %	Economic Cost 1000 Baht	Residual Value %	Residual Value 1000 Baht
					83		50	
Selected Material	m3	180	-	0				
Removal of Existing Pavement Structure	m3	60	13,650	819				
Subbase Soil Aggregate	m3	220	3,900	858				
Base Course Crushed Stone	m3	350	5,400	1,890				
Asphalt Concrete t=6.5cm	m2	124	148,500	18,414				
Asphalt Concrete t=9.0cm	m2	171	5,500	941				
Asphalt Concrete t=10.0cm	m2	190	33,000	6,270				
Prime Coat	m2	12	33,600	403				
Tack Coat	m2	8	159,500	1,276				
Shoulder Soil Aggregate	m3	250	15,500	3,875				
Total (a)				34,746		28,839		14,420
Miscellaneous Work ((a) x 7%)				2,432	83	2,019	0	0
CONTRACT AMOUNT (b)				37,178		30,858		14,420
PHYSICAL CONTINGENCIES ((b) x 10%) (c)				3,718		3,086		1,442
ENGINEERING AND SUPERVISION (d) (((b) + (c)) x 10%)				4,090	85		0	
PROJECT COST ((b) + (c) + (d))				44,986		33,944		15,862

Appendix 12.2.6 CONSTRUCTION QUANTITIES AND COSTS FOR OVERLAY & RECONSTRUCTION (2)

PROJECT RH-3

Item	Unit	Financial Unit Rate Baht	Quantity	Financial Total Cost 1000 Baht	Economic Cost %	Economic Cost 1000 Baht	Residual Value %	Residual Value 1000 Baht
					83		50	
Selected Material	m3	180	-	0				
Removal of Existing Pavement Structure	m3	60	14,000	840				
Subbase Soil Aggregate	m3	220	5,250	1,155				
Base Course Crushed Stone	m3	350	4,880	1,708				
Asphalt Concrete t=5.0cm	m2	95	-	0				
Asphalt Concrete t=8.0cm	m2		-	0				
Asphalt Concrete t=10.0cm	m2	190	78,000	14,820				
Prime Coat	m2	12	30,300	364				
Tack Coat	m2	8	96,000	768				
Shoulder Soil Aggregate	m3	250	6,500	1,625				
Total (a)				21,280		17,662		8,831
					83		0	
Miscellaneous Work ((a) x 7%)				1,490		1,237		0
CONTRACT AMOUNT (b)				22,770		18,899		8,831
PHYSICAL CONTINGENCIES ((b) x 10%) (c)				2,277		1,890		883
					85		0	
ENGINEERING AND SUPERVISION (d) (((b) + (c)) x 10%)				2,505				
PROJECT COST ((b) + (c) + (d))				27,552		20,789		9,714

PROJECT RH-4

Item	Unit	Financial Unit Rate Baht	Quantity	Financial Total Cost 1000 Baht	Economic Cost %	Economic Cost 1000 Baht	Residual Value %	Residual Value 1000 Baht
					83		50	
Selected Material	m3	180	-	0				
Removal of Existing Pavement Structure	m3	60	-	0				
Subbase Soil Aggregate	m3	220	-	0				
Base Course Crushed Stone	m3	350	-	0				
Asphalt Concrete t=6.0cm	m2	114	60,500	6,897				
Asphalt Concrete t=7.5cm	m2	143	11,000	1,573				
Asphalt Concrete t=10.0cm	m2	190	-	0				
Prime Coat	m2	12	-	0				
Tack Coat	m2	8	71,500	572				
Shoulder Soil Aggregate	m3	250	2,750	688				
Total (a)				9,730		8,076		4,038
					83		0	
Miscellaneous Work ((a) x 7%)				681		565		0
CONTRACT AMOUNT (b)				10,411		8,641		4,038
PHYSICAL CONTINGENCIES ((b) x 10%) (c)				1,041		864		404
					85		0	
ENGINEERING AND SUPERVISION (d) (((b) + (c)) x 10%)				1,145				
PROJECT COST ((b) + (c) + (d))				12,597		9,505		4,442

Appendix 12.2.6 CONSTRUCTION QUANTITIES AND COSTS FOR OVERLAY & RECONSTRUCTION (3)

PROJECT RH-5

Item	Unit	Financial Unit Rate Baht	Quantity	Financial Total Cost 1000 Baht	Economic Cost %	Economic Cost 1000 Baht	Residual Value %	Residual Value 1000 Baht
					83		50	
Selected Material	m3	180	-	0				
Removal of Existing Pavement Structure	m3	60	5,600	336				
Subbase Soil Aggregate	m3	220	1,600	352				
Base Course Crushed Stone	m3	350	2,250	788				
Asphalt Concrete t=5.5cm	m2	105	189,000	19,845				
Asphalt Concrete t=8.0cm	m2	152	7,000	1,064				
Asphalt Concrete t=10.0cm	m2	190	14,000	2,660				
Prime Coat	m2	12	14,140	170				
Tack Coat	m2	8	217,000	1,736				
Shoulder Soil Aggregate	m3	250	9,080	2,270				
Total (a)				29,221	83	24,253	0	12,127
Miscellaneous Work ((a) x 7%)				2,045		1,697		0
CONTRACT AMOUNT (b)				31,266		25,950		12,127
PHYSICAL CONTINGENCIES ((b) x 10%) (c)				3,127	85	2,595	0	1,213
ENGINEERING AND SUPERVISION (d) (((b) + (c)) x 10%)				3,439				
PROJECT COST ((b) + (c) + (d))				37,832		28,545		13,340

PROJECT RH-6

Item	Unit	Financial Unit Rate Baht	Quantity	Financial Total Cost 1000 Baht	Economic Cost %	Economic Cost 1000 Baht	Residual Value %	Residual Value 1000 Baht
					83		50	
Selected Material	m3	180	4,880	878				
Removal of Existing Pavement Structure	m3	60	14,630	878				
Subbase Soil Aggregate	m3	220	4,880	1,074				
Base Course Crushed Stone	m3	350	6,000	2,100				
Asphalt Concrete t=5cm	m2	95	-	0				
Asphalt Concrete t=10.0cm	m2	190	27,500	5,225				
Asphalt Concrete t=11.0cm	m2	209	88,000	18,392				
Prime Coat	m2	12	27,780	333				
Tack Coat	m2	8	203,500	1,628				
Shoulder Soil Aggregate	m3	250	10,100	2,525				
Total (a)				33,033	83	27,417	0	13,709
Miscellaneous Work ((a) x 7%)				2,312		1,919		0
CONTRACT AMOUNT (b)				35,345		29,336		13,709
PHYSICAL CONTINGENCIES ((b) x 10%) (c)				3,535	85	2,934	0	1,371
ENGINEERING AND SUPERVISION (d) (((b) + (c)) x 10%)				3,888				
PROJECT COST ((b) + (c) + (d))				42,768		32,270		15,080

Appendix 12.2.6 CONSTRUCTION QUANTITIES AND COSTS FOR OVERLAY & RECONSTRUCTION (4)

PROJECT RH-7

Item	Unit	Financial Unit Rate Baht	Quantity	Financial Total Cost 1000 Baht	Economic Cost %	Economic Cost 1000 Baht	Residual Value %	Residual Value 1000 Baht
					83		50	
Selected Material	m3	180	9,800	1,764				
Removal of Existing Pavement Structure	m3	60	24,500	1,470				
Subbase Soil Aggregate	m3	220	9,800	2,156				
Base Course Crushed Stone	m3	350	9,100	3,185				
Asphalt Concrete t=5cm	m2	95	-	0				
Asphalt Concrete t=8cm	m2	175	-	0				
Asphalt Concrete t=10.0cm	m2	190	58,200	11,058				
Prime Coat	m2	12	42,420	509				
Tack Coat	m2	8	36,600	293				
Shoulder Soil Aggregate	m3	250	3,880	970				
Total (a)				21,405	83	17,766	0	8,883
Miscellaneous Work ((a) x 7%)				1,498		1,243		0
CONTRACT AMOUNT (b)				22,903		19,009		8,883
PHYSICAL CONTINGENCIES ((b) x 10%) (c)				2,290	85	1,901	0	888
ENGINEERING AND SUPERVISION (d) (((b) + (c)) x 10%)				2,519				
PROJECT COST ((b) + (c) + (d))				27,712		20,910		9,771

PROJECT RH-8

Item	Unit	Financial Unit Rate Baht	Quantity	Financial Total Cost 1000 Baht	Economic Cost %	Economic Cost 1000 Baht	Residual Value %	Residual Value 1000 Baht
					83		50	
Selected Material	m3	180	-	0				
Removal of Existing Pavement Structure	m3	60	71,500	4,290				
Subbase Soil Aggregate	m3	220	35,750	7,865				
Base Course Crushed Stone	m3	350	27,300	9,555				
Asphalt Concrete t=4.5cm	m2	86	5,500	473				
Asphalt Concrete t=5.0cm	m2	95	151,250	14,369				
Asphalt Concrete t=7.5cm	m2	143	27,500	3,933				
Prime Coat	m2	12	154,000	1,848				
Tack Coat	m2	8	33,000	264				
Shoulder Soil Aggregate	m3	250	12,050	3,013				
Total (a)				45,610	83	37,856	0	18,928
Miscellaneous Work ((a) x 7%)				3,193		2,650		0
CONTRACT AMOUNT (b)				48,803		40,506		18,928
PHYSICAL CONTINGENCIES ((b) x 10%) (c)				4,880	85	4,051	0	1,893
ENGINEERING AND SUPERVISION (d) (((b) + (c)) x 10%)				5,368				
PROJECT COST ((b) + (c) + (d))				59,051		44,557		20,821

Appendix 12.3.1. BENEFITS OF REHABILITATION PROJECTS (1)

PROJECT RH-1

VOC SAVINGS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
1990	1349.	4500.	512.	999.	1842.	1441.	1223.	11867.
1996	1903.	6667.	733.	1434.	2436.	1909.	1624.	16706.

TIME SAVINGS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
1990	500.	1938.	625.	2499.	584.	306.	175.	6626.
1996	705.	2871.	895.	3585.	772.	405.	233.	9465.

TOTAL BENEFITS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
1990	1849.	6438.	1137.	3498.	2426.	1747.	1398.	18494.
1996	2608.	9538.	1627.	5019.	3207.	2315.	1857.	26171.

PROJECT RH-2

VOC SAVINGS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
1990	4462.	20744.	1756.	3184.	6360.	5483.	839.	42828.
1996	5758.	28116.	2515.	4554.	7402.	7248.	1111.	56705.

TIME SAVINGS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
1990	1955.	10793.	2482.	8891.	2453.	1300.	137.	28011.
1996	2523.	14628.	3555.	12719.	2855.	1718.	181.	38179.

TOTAL BENEFITS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
1990	6417.	31537.	4238.	12075.	8813.	6783.	976.	70839.
1996	8282.	42744.	6071.	17273.	10257.	8966.	1292.	94884.

PROJECT RH-3

VOC SAVINGS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
1990	1576.	13911.	4316.	3797.	3414.	2280.	2563.	31857.
1996	2217.	20275.	5985.	5266.	4508.	3029.	3439.	44719.

TIME SAVINGS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
1990	792.	8475.	6856.	11548.	1554.	588.	463.	30277.
1996	1114.	12353.	9508.	16015.	2052.	782.	622.	42445.

TOTAL BENEFITS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
1990	2368.	22386.	11172.	15346.	4968.	2868.	3026.	62134.
1996	3331.	32628.	15494.	21280.	6560.	3811.	4060.	87164.

PROJECT RH-4

VOC SAVINGS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
1990	417.	2130.	957.	538.	1347.	1014.	1318.	7722.
1996	838.	4749.	1363.	1047.	2481.	2023.	3569.	16070.

TIME SAVINGS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
1990	154.	917.	1169.	1345.	427.	215.	189.	4416.
1996	310.	2045.	1664.	2619.	786.	429.	512.	8365.

TOTAL BENEFITS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
1990	571.	3048.	2126.	1882.	1774.	1229.	1507.	12138.
1996	1149.	6794.	3026.	3666.	3266.	2452.	4081.	24434.

Appendix 12.3.1. BENEFITS OF REHABILITATION PROJECTS (2)

PROJECT RH-5

VOC SAVINGS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
1990	2877.	18089.	3754.	13088.	16756.	6584.	19889.	81037.
1996	4246.	26711.	6239.	16958.	25146.	9908.	27885.	117093.

TIME SAVINGS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
1990	1144.	8434.	4878.	34325.	5765.	1465.	3015.	59026.
1996	1688.	12454.	8107.	44475.	8652.	2205.	4227.	81809.

TOTAL BENEFITS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
1990	4021.	26522.	8632.	47413.	22522.	8050.	22904.	140064.
1996	5934.	39165.	14347.	61434.	33798.	12113.	32112.	198902.

PROJECT RH-6

VOC SAVINGS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
1990	1055.	5758.	1156.	1540.	9833.	16411.	16514.	52267.
1996	1433.	8765.	1666.	2204.	13019.	21739.	21869.	70694.

TIME SAVINGS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
1990	484.	3157.	1700.	4426.	4006.	4004.	2792.	20569.
1996	658.	4806.	2449.	6336.	5304.	5304.	3697.	28554.

TOTAL BENEFITS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
1990	1539.	8915.	2856.	5966.	13839.	20415.	19306.	72836.
1996	2091.	13570.	4115.	8540.	18323.	27043.	25565.	99247.

PROJECT RH-7

VOC SAVINGS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
1990	711.	1161.	1663.	19.	2254.	9626.	2675.	18109.
1996	960.	1768.	2387.	25.	2984.	12781.	3539.	24444.

TIME SAVINGS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
1990	414.	841.	2987.	63.	1232.	2709.	538.	8784.
1996	559.	1281.	4287.	84.	1631.	3597.	711.	12151.

TOTAL BENEFITS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
1990	1125.	2003.	4650.	82.	3486.	12335.	3213.	26893.
1996	1519.	3049.	6674.	109.	4616.	16379.	4250.	36595.

PROJECT RH-8

VOC SAVINGS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
1990	1564.	4138.	3458.	5092.	4915.	1845.	5892.	26904.
1996	2389.	6260.	4936.	7319.	8585.	2460.	7897.	39848.

TIME SAVINGS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
1990	1402.	4413.	8061.	20810.	3663.	686.	1568.	40602.
1996	2142.	6675.	11508.	29913.	6398.	915.	2101.	59652.

TOTAL BENEFITS

(1000 BAHT/YEAR)

YEAR	MC	PC	LB	HB	LT	MT	HT	TOTAL
1990	2967.	8551.	11518.	25902.	8578.	2531.	7459.	67506.
1996	4531.	12935.	16445.	37232.	14983.	3375.	9999.	99499.

Appendix 12.4.1. ECONOMIC EVALUATION FOR REHABILITATION PROJECTS (1)

PROJECT RH-1

COST AND BENEFIT STATEMENT

(THOUSAND BAHT)

YEAR	COST: CONST. COST	BENEFITS: VOC SAVING	BENEFITS: TIME SAVING	BENEFITS: TOTAL	DISCOUNTED(12%): COST	DISCOUNTED(12%): BENEFIT
1989	18,152			0	20,330	0
1990		11,867	6,626	18,493	0	16,512
1991		12,674	7,099	19,773	0	15,763
1992		13,480	7,573	21,053	0	14,985
1993		14,287	8,046	22,333	0	14,193
1994		15,093	8,519	23,612	0	13,398
1995		15,899	8,992	24,891	0	12,611
1996	(8,482)	16,706	9,465	26,171	(4,297)	11,838
TOTAL	9,670	100,006	56,319	156,326	16,033	99,300

NET PRESENT VALUE : 83,267
BENEFIT COST RATIO : 6.19
INTERNAL RATE OF RETURN : 65.9%

PROJECT RH-2

COST AND BENEFIT STATEMENT

(THOUSAND BAHT)

YEAR	COST: CONST. COST	BENEFITS: VOC SAVING	BENEFITS: TIME SAVING	BENEFITS: TOTAL	DISCOUNTED(12%): COST	DISCOUNTED(12%): BENEFIT
1989	33,944			0	38,017	0
1990		42,828	28,011	70,839	0	63,249
1991		45,141	29,706	74,847	0	59,668
1992		47,454	31,401	78,855	0	56,127
1993		49,766	33,095	82,861	0	52,660
1994		52,079	34,790	86,869	0	49,292
1995		54,392	36,485	90,877	0	46,041
1996	(15,862)	56,705	38,180	94,885	(8,036)	42,921
TOTAL	18,082	348,365	231,667	580,033	29,981	369,958

NET PRESENT VALUE : 339,977
BENEFIT COST RATIO : 12.34
INTERNAL RATE OF RETURN : 106.1%

PROJECT RH-3

COST AND BENEFIT STATEMENT

(THOUSAND BAHT)

YEAR	COST: CONST. COST	BENEFITS: VOC SAVING	BENEFITS: TIME SAVING	BENEFITS: TOTAL	DISCOUNTED(12%): COST	DISCOUNTED(12%): BENEFIT
1989	20,789			0	23,284	0
1990		31,857	30,277	62,134	0	55,477
1991		34,001	32,305	66,306	0	52,859
1992		36,144	34,333	70,477	0	50,164
1993		38,288	36,361	74,649	0	47,441
1994		40,432	38,389	78,821	0	44,725
1995		42,576	40,417	82,993	0	42,047
1996	(9,714)	44,719	42,445	87,164	(4,921)	39,429
TOTAL	11,075	268,017	254,528	522,544	18,363	332,142

NET PRESENT VALUE : 313,779
BENEFIT COST RATIO : 18.09
INTERNAL RATE OF RETURN : 133.9%

PROJECT RH-4

COST AND BENEFIT STATEMENT

(THOUSAND BAHT)

YEAR	COST: CONST. COST	BENEFITS: VOC SAVING	BENEFITS: TIME SAVING	BENEFITS: TOTAL	DISCOUNTED(12%): COST	DISCOUNTED(12%): BENEFIT
1989	9,505			0	10,646	0
1990		7,722	4,416	12,138	0	10,838
1991		9,113	5,074	14,187	0	11,310
1992		10,504	5,732	16,236	0	11,556
1993		11,896	6,390	18,286	0	11,621
1994		13,287	7,048	20,335	0	11,539
1995		14,679	7,707	22,386	0	11,341
1996	(4,442)	16,070	8,365	24,435	(2,250)	11,053
TOTAL	5,063	83,271	44,733	128,003	8,396	79,258

NET PRESENT VALUE : 70,862
BENEFIT COST RATIO : 9.44
INTERNAL RATE OF RETURN : 82.4%

Appendix 12.4.1. ECONOMIC EVALUATION FOR REHABILITATION PROJECTS (2)

PROJECT RH-5

COST AND BENEFIT STATEMENT

(THOUSAND BAHT)

	COST	BENEFITS			DISCOUNTED(12%)	
YEAR	CONST COST	VOC SAVING	TIME SAVING	TOTAL	COST	BENEFIT
1989	28,545			0	31,970	0
1990		81,037	59,026	140,063	0	125,056
1991		87,047	62,823	149,870	0	119,475
1992		93,056	66,621	159,677	0	113,655
1993		99,065	70,418	169,483	0	107,710
1994		105,075	74,215	179,290	0	101,734
1995		111,084	78,012	189,096	0	95,802
1996	(13,340)	117,093	81,809	198,902	(6,758)	89,973
TOTAL	15,205	693,458	492,923	1,186,381	25,212	753,405

NET PRESENT VALUE : 728,193
BENEFIT COST RATIO : 29.88
INTERNAL RATE OF RETURN : 181.1%

PROJECT RH-6

COST AND BENEFIT STATEMENT

(THOUSAND BAHT)

	COST	BENEFITS			DISCOUNTED(12%)	
YEAR	CONST. COST	VOC SAVING	TIME SAVING	TOTAL	COST	BENEFIT
1989	32,270			0	36,142	0
1990		52,267	20,569	72,836	0	65,032
1991		55,338	21,900	77,238	0	61,574
1992		58,409	23,231	81,640	0	58,110
1993		61,480	24,562	86,042	0	54,681
1994		64,551	25,892	90,443	0	51,320
1995		67,623	27,223	94,846	0	48,052
1996	(15,080)	70,694	28,554	99,248	(7,640)	44,895
TOTAL	17,190	430,361	171,931	602,293	28,502	383,664

NET PRESENT VALUE : 355,162
BENEFIT COST RATIO : 13.46
INTERNAL RATE OF RETURN : 111.8%

PROJECT RH-7

COST AND BENEFIT STATEMENT

(THOUSAND BAHT)

	COST	BENEFITS			DISCOUNTED(12%)	
YEAR	CONST. COST	VOC SAVING	TIME SAVING	TOTAL	COST	BENEFIT
1989	20,910			0	23,419	0
1990		18,109	8,784	26,893	0	24,012
1991		19,165	9,346	28,511	0	22,729
1992		20,221	9,907	30,128	0	21,445
1993		21,277	10,468	31,745	0	20,175
1994		22,332	11,029	33,361	0	18,930
1995		23,388	11,590	34,978	0	17,721
1996	(9,771)	24,444	12,151	36,595	(4,950)	16,554
TOTAL	11,139	148,936	73,274	222,211	18,469	141,566

NET PRESENT VALUE : 123,097
BENEFIT COST RATIO : 7.67
INTERNAL RATE OF RETURN : 77.0%

PROJECT RH-8

COST AND BENEFIT STATEMENT

(THOUSAND BAHT)

	COST	BENEFITS			DISCOUNTED(12%)	
YEAR	CONST. COST	VOC SAVING	TIME SAVING	TOTAL	COST	BENEFIT
1989	44,557			0	49,904	0
1990		26,904	40,602	67,506	0	60,273
1991		29,061	43,777	72,838	0	58,066
1992		31,219	46,952	78,171	0	55,641
1993		33,376	50,127	83,503	0	53,068
1994		35,533	53,302	88,835	0	50,407
1995		37,690	56,477	94,167	0	47,708
1996	(20,821)	39,848	59,652	99,500	(10,549)	45,009
TOTAL	23,736	233,631	350,888	584,520	39,355	370,172

NET PRESENT VALUE : 330,817
BENEFIT COST RATIO : 9.41
INTERNAL RATE OF RETURN : 87.1%

JICA