

## หนังสืออ้างอิง

1. ประโมทย์ อุทโทวทยะ . "เทคนิคแสงสว่าง." ภาควิชาวิศวกรรมไฟฟ้า คณะวิศวกรรมศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย, 2524.
2. จุมพล เลิศชูวงศ์ . "อิทธิพลของผิวถนนต่อความส่องสว่างและการวัดคุณภาพของแสงไฟถนน." วิทยานิพนธ์ปริญญาโทบัณฑิต แผนกวิศวกรรมไฟฟ้า บัณฑิตวิทยาลัย จุฬาลงกรณ์มหาวิทยาลัย, 2521.
3. IES Lighting Handbook. 4 th ed. New York, : Illumination Engineering Society, 1966.
4. W.J.M. Van Bounmel; J.B. De Boer. Road Lighting. Eindhoven, The Netherlands, 1980.
5. "Calculation and Measurement of Luminance and Illuminance in Road Lighting." Paris, France, Publication CIE No 30 (TC-4.6), 1976.
6. "Glare and Uniformity in Road Lighting Installations." Paris, France, Publication CIE No 31 (TC-4.6), 1976.
7. "Road Lighting Lantern and Installation Data -Photometrics, Classification and Performance, Paris, France, Publication CIE No 34 (TC-4.6), 1977.

ภาคผนวกที่ 1 ตาราง R1

$\alpha \backslash \text{tg } \alpha$	0	2	5	10	15	20	25	30	35	40	45	60	75	90	105	120	135	150	165	180
0	655	655	655	655	655	655	655	655	655	655	655	655	655	655	655	655	655	655	655	655
0,25	619	619	619	619	610	610	610	610	610	610	610	610	610	601	601	601	601	601	601	601
0,5	539	539	539	539	539	539	521	521	521	521	521	503	503	503	503	503	503	503	503	503
0,75	431	431	431	431	431	431	431	431	431	431	395	386	371	371	371	371	371	386	395	395
1	341	341	341	341	323	323	305	296	287	287	278	269	269	269	269	269	269	278	278	278
1,25	269	269	269	260	251	242	224	207	198	189	189	180	180	180	180	180	189	198	207	224
1,5	224	224	224	215	198	180	171	162	153	148	144	144	139	139	139	144	148	153	162	180
1,75	189	189	189	171	153	139	130	121	117	112	108	103	99	99	103	108	112	121	130	139
2	162	162	157	135	117	108	99	94	90	85	85	83	84	84	86	90	94	99	103	111
2,5	121	121	117	95	79	66	60	57	54	52	51	50	51	52	54	58	61	65	69	75
3	94	94	86	66	49	41	38	36	34	33	32	31	31	33	35	38	40	43	47	51
3,5	81	80	66	46	33	28	25	23	22	22	21	21	22	22	24	27	29	31	34	38
4	71	69	55	32	23	20	18	16	15	14	14	14	15	17	19	20	22	23	25	27
4,5	63	59	43	24	17	14	13	12	12	11	11	11	12	13	14	14	16	17	19	21
5	57	52	36	19	14	12	10	9,0	9,0	8,8	8,7	8,7	9,0	10	11	13	14	15	16	16
5,5	51	47	31	15	11	9,0	8,1	7,8	7,7	7,7										
6	47	42	25	12	8,5	7,2	6,5	6,3	6,2											
6,5	43	38	22	10	6,7	5,8	5,2	5,0												
7	40	34	18	8,1	5,6	4,8	4,4	4,2												
7,5	37	31	15	6,9	4,7	4,0	3,8													
8	35	28	14	5,7	4,0	3,6	3,2													
8,5	33	25	12	4,8	3,6	3,1	2,9													
9	31	23	10	4,1	3,2	2,8														
9,5	30	22	9,0	3,7	2,8	2,5														
10	29	20	8,2	3,2	2,4	2,2														
10,5	28	18	7,3	3,0	2,2	1,9														
11	27	16	6,6	2,7	1,9	1,7														
11,5	26	15	6,1	2,4	1,7															
12	25	14	5,6	2,2	1,6															

r-table for standard surface R1  
 $R_0 = 0,10$ ,  $S_1 = 0,25$ ,  $S_2 = 1,53$

ภาคผนวกที่ 2 ตาราง R2

$\alpha \backslash \beta$	0	2	5	10	15	20	25	30	35	40	45	60	75	90	105	120	135	150	165	180
0	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390
0,25	411	411	411	411	411	411	411	411	411	411	379	368	357	357	346	346	346	335	335	335
0,5	411	411	411	411	403	403	384	379	370	346	325	303	281	281	271	271	271	260	260	260
0,75	379	379	379	368	357	346	325	303	281	260	236	216	206	206	206	206	206	206	206	206
1	335	335	335	325	292	291	260	238	216	195	173	152	152	152	152	152	141	141	141	141
1,25	303	303	292	271	238	206	184	152	130	119	108	100	103	106	108	108	114	114	119	119
1,5	271	271	260	227	179	152	141	119	108	93	80	76	76	80	84	87	89	91	93	95
1,75	249	238	227	195	152	124	106	91	78	67	61	52	54	58	63	67	69	71	73	74
2	227	216	195	152	117	95	80	67	61	52	45	40	41	45	49	52	54	56	57	58
2,5	195	190	146	110	74	58	48	40	35	30	27	24	26	28	30	33	35	38	40	41
3	160	155	115	67	43	33	26	21	18	17	16	16	17	17	18	21	22	24	26	27
3,5	146	131	87	41	25	18	15	13	12	11	11	11	11	11	12	14	15	17	18	21
4	132	113	67	27	15	12	10	9,4	8,7	8,2	7,9	7,6	7,9	6,7	9,6	11	12	13	15	17
4,5	118	95	50	20	12	8,9	7,4	6,6	6,3	6,1	5,7	5,6	5,8	6,3	7,1	8,4	10	12	13	14
5	106	81	38	14	8,2	6,3	5,4	5,0	4,8	4,7	4,5	4,4	4,8	5,2	6,2	7,4	8,5	9,5	10	11
5,5	96	69	29	11	6,3	5,1	4,4	4,1	3,9	3,8										
6	87	58	22	8,0	5,0	3,9	3,5	3,4	3,2											
6,5	78	50	17	6,1	3,8	3,1	2,8	2,7												
7	71	43	14	4,9	3,1	2,5	2,3	2,2												
7,5	67	38	12	4,1	2,6	2,1	1,9													
8	63	33	10	3,4	2,2	1,8	1,7													
8,5	58	28	8,7	2,9	1,9	1,6	1,5													
9	55	25	7,4	2,5	1,7	1,4														
9,5	52	23	6,5	2,2	1,5	1,3														
10	49	21	5,6	1,9	1,4	1,2														
10,5	47	18	5,0	1,7	1,3	1,2														
11	44	16	4,4	1,6	1,2	1,1														
11,5	42	14	4,0	1,5	1,1															
12	41	13	3,6	1,4	1,1															

r-table for standard surface R2  
 $\alpha_0 = 0,07$ ,  $S_1 = 0,58$ ,  $S_2 = 1,80$

มหาวิทยาลัย  
 วิศวกรรมมหาวิทยาลัย

ภาคผนวกที่ 3 ตาราง R3

$\beta$ tg $\beta$	0	2	5	10	15	20	25	30	35	40	45	60	75	90	105	120	135	150	165	180
0	294	294	294	294	294	294	294	294	294	294	294	294	294	294	294	294	294	294	294	294
0,25	326	326	321	321	317	312	308	308	303	298	294	280	271	262	258	253	249	244	240	240
0,5	344	344	339	339	326	317	308	298	289	276	262	235	217	204	199	199	199	199	194	194
0,75	357	353	353	339	321	303	285	267	244	222	204	176	158	149	149	149	145	136	136	140
1	362	362	352	326	276	249	226	204	181	158	140	118	104	100	100	100	100	100	100	100
1,25	357	357	348	298	244	208	176	154	136	118	104	83	73	70	71	74	77	77	77	75
1,5	353	348	326	267	217	176	145	117	100	86	78	72	60	57	58	62	60	60	61	62
1,75	339	335	303	231	172	127	104	89	79	70	62	51	45	44	45	46	45	45	46	47
2	326	321	280	190	136	100	82	71	62	54	48	39	34	34	34	35	36	36	37	38
2,5	289	280	222	127	86	65	54	44	38	34	25	23	22	23	24	24	24	24	24	25
3	253	235	163	85	53	38	31	25	23	20	18	15	15	14	15	15	16	16	17	17
3,5	217	194	122	60	35	25	22	19	16	15	13	9,9	9,0	9,0	9,9	11	11	12	12	13
4	190	163	90	43	26	20	16	14	12	9,9	9,0	7,4	7,0	7,1	7,5	8,3	8,7	9,0	9,0	9,9
4,5	163	136	73	31	20	15	12	9,9	9,0	8,3	7,7	5,4	4,8	4,9	5,4	6,1	7,0	7,7	8,3	8,5
5	145	109	60	24	16	12	9,0	8,2	7,7	6,8	6,1	4,3	3,2	3,3	3,7	4,3	5,2	6,5	6,9	7,1
5,5	127	94	47	18	14	9,9	7,7	6,9	6,1	5,7										
6	113	77	36	15	11	9,0	8,0	6,5	5,1											
6,5	104	68	30	11	8,3	6,4	5,1	4,3												
7	95	60	24	8,5	6,5	5,2	4,3	3,4												
7,5	87	53	21	7,1	5,3	4,4	3,6													
8	83	47	17	6,1	4,4	3,6	3,1													
8,5	78	42	15	5,2	3,7	3,1	2,6													
9	73	38	12	4,3	3,2	2,4														
9,5	69	34	9,9	3,8	3,5	2,2														
10	65	32	9,0	3,3	2,4	2,0														
10,5	62	29	8,0	3,0	2,1	1,9														
11	59	26	7,1	2,6	1,9	1,8														
11,5	56	24	6,3	2,4	1,8															
12	53	22	5,6	2,1	1,8															

r-table for standard surface R3  
 $Q_0 = 0,07$ ,  $S_1 = 1,11$ ,  $S_2 = 2,38$

ภาคผนวกที่ 4 ตาราง R4

$\alpha \backslash \beta$	0	2	5	10	15	20	25	30	35	40	45	60	75	90	105	120	135	150	165	180
0	264	264	264	264	264	264	264	264	264	264	264	264	264	264	264	264	264	264	264	264
0,25	297	317	317	317	317	310	304	290	284	277	271	244	231	224	224	218	218	211	211	211
0,5	330	343	343	343	330	310	297	284	277	264	251	218	198	185	178	172	172	165	165	165
0,75	376	383	370	350	330	304	277	251	231	211	198	165	139	132	132	125	125	125	119	119
1	396	396	396	330	290	251	218	198	185	165	145	112	86	86	86	86	86	87	87	87
1,25	403	409	370	310	251	211	178	152	132	115	103	77	66	65	65	63	65	66	67	68
1,5	409	396	356	284	218	172	139	115	100	88	79	61	50	50	50	50	52	55	55	55
1,75	409	396	343	251	178	139	108	88	75	66	59	44	37	37	37	38	40	41	42	45
2	409	383	317	224	145	106	86	71	59	53	45	33	29	29	29	30	32	33	34	37
2,5	396	356	264	152	100	73	55	45	37	32	28	21	20	20	20	21	22	24	25	26
3	370	304	211	95	63	44	30	25	21	17	16	13	12	12	13	13	15	16	17	19
3,5	343	271	165	63	40	26	19	15	13	12	11	9,8	9,1	8,8	8,8	9,4	11	12	13	15
4	317	238	132	45	24	16	13	11	9,6	9,0	8,4	7,5	7,4	7,4	7,5	7,9	8,6	9,4	11	12
4,5	297	211	106	33	17	11	9,2	7,9	7,3	6,6	6,3	6,1	6,1	6,2	6,5	6,7	7,1	7,7	8,7	9,6
5	277	185	79	24	13	8,3	7,0	6,3	5,7	5,1	5,0	5,0	5,1	5,4	5,5	5,8	6,1	6,3	6,9	7,7
5,5	257	161	59	19	9,9	7,1	5,7	5,0	4,6	4,2										
6	244	140	46	13	7,7	5,7	4,8	4,1	3,8											
6,5	231	122	37	11	5,9	4,6	3,7	3,2												
7	218	106	32	9,0	5,0	3,8	3,2	2,6												
7,5	205	94	26	7,5	4,4	3,3	2,8													
8	193	82	22	6,3	3,7	2,9	2,4													
8,5	184	74	19	5,3	3,2	2,5	2,1													
9	174	66	16	4,6	2,8	2,1														
9,5	169	59	13	4,1	2,5	2,0														
10	164	53	12	3,7	2,2	1,7														
10,5	158	49	11	3,3	2,1	1,7														
11	153	45	9,5	3,0	2,0	1,7														
11,5	149	41	8,4	2,6	1,7															
12	145	37	7,7	2,5	1,7															

r-table for standard surface R4

$Q_0 = 0,08$ ,  $S_1 = 1,55$ ,  $S_2 = 3,03$

ภาคผนวกที่ 5 ตาราง N1

$\beta$ tg $\gamma$	0.	2.	5.	10.	15.	20.	25.	30.	35.	40.
.00	768	768	768	768	768	768	768	768	768	768
.25	694	894	594	694	694	693	693	693	593	593
.50	557	557	557	553	554	550	546	544	544	543
.75	424	424	424	417	415	406	397	392	388	382
1.00	323	322	321	310	302	289	278	271	266	261
1.25	252	250	247	234	220	206	193	186	180	176
1.50	202	196	193	177	160	147	135	128	124	121
1.75	164	162	154	134	117	104	94	89	87	84
2.00	138	136	126	104	88	76	69	65	63	61
2.50	103	100	86	64	51	43	38	36	35	35
3.00	80	75	61	41	31	26	24	22	21	21
3.50	65	60	45	28	21	17	15	15	15	15
4.00	55	48	34	20	14	12	11	10	10	10
4.50	47	40	26	14	11	8	8	8	8	8
5.00	40	34	20	11	8	6	6	5	5	5
5.50	35	28	15	8	6	5	5	5	5	5
6.00	31	25	13	7	5	4	4	4	4	4
6.50	28	21	11	5	4	3	3	3	3	3
7.00	25	19	9	5	3	3	3	3	3	3
7.50	23	17	8	4	3	3	3	3	3	3
8.00	21	15	7	4	3	2	2	2	2	2
8.50	19	14	6	3	2	2	2	2	2	2
9.00	18	13	5	3	2	2	2	2	2	2
9.50	17	12	5	2	2	2	2	2	2	2
10.00	16	11	4	2	2	2	2	2	2	2
10.50	15	10	4	2	2	1	1	1	1	1
11.00	15	9	4	2	2	1	1	1	1	1
11.50	14	9	3	2	2	1	1	1	1	1
12.00	14	8	3	2	2	1	1	1	1	1

$\beta$ tg $\gamma$	45.	60.	75.	90.	105.	120.	135.	150.	165.	180.
.00	768	768	768	768	768	768	768	768	768	768
.25	695	699	702	714	720	734	741	751	753	757
.50	545	642	547	564	577	600	615	633	640	646
.75	378	381	388	407	425	450	469	489	497	505
1.00	257	259	266	284	303	328	346	368	375	381
1.25	173	175	183	200	216	237	254	271	279	285
1.50	119	122	129	142	157	175	189	204	212	216
1.75	84	86	93	104	116	131	144	155	162	166
2.00	61	63	69	78	88	101	111	121	127	131
2.50	35	37	41	48	55	64	71	79	84	86
3.00	21	23	26	31	36	42	48	55	58	60
3.50	15	16	18	21	25	31	35	39	42	44
4.00	10	12	13	16	19	23	26	30	32	34
4.50	8	8	10	12	15	18	20	23	25	27
5.00	6	6	8	10	12	14	16	18	21	21

r-table for standard surface N1  
 $Q_0 = 0,100$     $S_1 = 0,18$     $S_2 = 1,30$



ภาคผนวกที่ 6 ตาราง N2

$\beta$ tgy	0.	2.	5.	10.	15.	20.	25.	30.	35.	40.
.00	474	474	474	474	474	474	474	474	474	474
.25	472	471	471	470	470	468	466	464	463	459
.50	427	426	426	422	418	413	408	399	399	382
.75	374	372	370	361	349	336	321	309	297	285
1.00	326	323	319	303	284	263	243	227	213	202
1.25	284	281	275	251	224	198	178	161	149	139
1.50	249	246	238	203	172	146	127	113	104	97
1.75	219	216	201	162	129	106	91	81	73	68
2.00	194	190	171	128	97	78	65	57	53	49
2.50	157	150	124	82	57	44	37	32	30	28
3.00	130	120	90	52	35	26	22	19	18	17
3.50	110	98	65	34	22	16	14	13	12	11
4.00	94	80	48	23	15	11	9	9	8	8
4.50	80	65	36	17	10	8	7	6	6	6
5.00	70	55	28	12	8	6	5	5	4	4
5.50	61	46	22	9	6	4	4	3	3	3
6.00	54	39	18	7	5	4	3	3	3	
6.50	48	34	14	6	4	3	2	2	2	
7.00	43	30	12	5	3	2	2	2	2	
7.50	39	27	10	4	2	2	2			
8.00	36	23	9	3	2	2	1			
8.50	33	21	7	3	2	1	1			
9.00	30	18	6	2	1	1				
9.50	28	17	5	2	1	1				
10.00	26	16	5	2	1	1				
10.50	25	14	4	1	1	0				
11.00	23	13	4	1	1	0				
11.50	22	12	3	1	1					
12.00	21	12	3	1	1					

$\beta$ tgy	45.	60.	75.	90.	105.	120.	135.	150.	165.	180.
.00	474	474	474	474	474	474	474	474	474	474
.25	450	450	443	439	435	434	434	435	436	436
.50	375	359	347	343	341	344	348	352	353	356
.75	275	255	245	244	245	253	256	262	265	268
1.00	193	177	170	170	174	180	186	192	196	199
1.25	132	121	117	119	123	129	135	141	145	147
1.50	92	84	83	86	89	94	99	105	108	110
1.75	64	60	59	62	65	70	74	79	82	84
2.00	46	44	44	46	49	53	57	61	64	65
2.50	27	26	26	28	30	33	37	40	42	43
3.00	17	16	17	18	20	22	24	27	28	29
3.50	11	11	11	12	14	16	18	19	21	21
4.00	8	8	8	9	10	12	13	15	16	16
4.50	6	6	6	7	8	9	10	11	12	13
5.00	4	4	5	5	6	7	8	9	10	10

r-table for standard surface N2.  
 $Q_0 = 0,070$      $S_1 = 0,41$      $S_2 = 1,48$



## ภาคผนวกที่ 7 ตาราง N3

$\beta$ tgr	0.	2.	5.	10.	15.	20.	25.	30.	35.	40.
.00	354	354	354	354	354	354	354	354	354	354
.25	391	391	390	389	388	385	381	378	373	369
.50	426	404	403	397	390	379	366	355	343	330
.75	465	403	399	384	365	342	319	298	276	260
1.00	396	392	384	357	322	287	254	228	207	189
1.25	383	374	360	317	269	227	193	168	149	134
1.50	360	351	328	270	215	172	141	119	105	94
1.75	335	325	294	224	165	127	102	86	75	67
2.00	312	298	259	182	126	94	75	63	56	50
2.50	270	250	199	120	76	53	43	35	32	28
3.00	233	206	148	78	46	31	26	21	19	18
3.50	202	171	109	51	29	20	17	14	13	12
4.00	177	142	82	35	20	13	11	10	9	9
4.50	155	118	61	24	14	10	8	7	7	6
5.00	137	100	47	18	10	7	6	5	5	5
5.50	121	84	37	13	8	6	5	4	4	4
6.00	108	72	29	11	6	5	4	4	4	
6.50	97	62	24	9	5	4	4	3		
7.00	89	55	20	7	4	3	3	2		
7.50	81	49	17	6	4	3	3			
8.00	74	43	15	5	3	2	2			
8.50	68	38	12	4	3	2	2			
9.00	63	34	11	4	2	2				
9.50	58	31	9	3	2	2				
10.00	54	28	8	3	2	2				
10.50	51	26	7	3	2	1				
11.00	48	24	6	2	2	1				
11.50	45	22	6	2	1					
12.00	43	21	5	2	1					

$\beta$ tgr	45.	60.	75.	90.	105.	120.	135.	150.	165.	180.
.00	354	354	354	354	354	354	354	354	354	354
.25	365	351	338	328	319	313	308	306	304	304
.50	318	291	268	256	247	242	240	240	240	240
.75	244	213	192	182	176	175	175	176	177	177
1.00	175	147	133	126	124	123	125	127	129	130
1.25	123	103	93	89	87	89	91	94	95	96
1.50	86	72	66	63	63	64	67	69	71	72
1.75	61	52	47	46	47	48	50	52	54	55
2.00	45	38	35	35	35	37	38	40	42	43
2.50	26	23	22	21	22	23	24	27	28	28
3.00	17	15	14	14	15	16	17	18	19	20
3.50	11	10	10	10	11	11	12	13	14	15
4.00	8	7	7	7	8	8	9	10	11	11
4.50	6	5	5	6	6	6	7	8	9	9
5.00	5	4	4	5	5	5	6	6	7	7

r-table for standard surface N3  
 $Q0 = 0,070$     $S1 = 0,88$     $S2 = 1,98$

ภาคผนวกที่ 8 ตาราง N4

$\beta$ tg $\gamma$	0.	2.	5.	10.	15.	20.	25.	30.	35.	40.
.00	282	282	282	282	282	282	282	282	282	282
.25	332	332	331	328	328	324	319	315	311	303
.50	375	374	373	367	358	345	331	318	305	287
.75	412	411	406	388	381	337	314	284	256	235
1.00	441	438	426	385	341	294	251	220	195	174
1.25	459	453	430	365	299	243	198	168	145	128
1.50	466	456	417	326	246	189	149	122	105	92
1.75	454	449	392	284	199	146	114	92	79	69
2.00	453	431	356	234	153	108	85	69	60	52
2.50	425	387	283	152	93	64	50	41	36	31
3.00	385	333	211	98	57	38	30	25	22	19
3.50	349	286	158	66	37	25	20	17	15	13
4.00	316	245	117	47	27	18	14	12	11	10
4.50	286	207	88	33	20	14	11	9	8	7
5.00	260	175	69	24	15	10	8	7	6	5
5.50	237	147	54	19	12	8	6	5	4	3
6.00	217	132	43	15	9	6	5	4	3	2
6.50	198	108	35	12	7	5	4	3	2	1
7.00	184	95	28	9	6	5	4	3	2	1
7.50	169	85	23	8	5	4	3	2	1	1
8.00	158	75	20	7	4	3	3	2	1	1
8.50	148	68	17	6	4	3	3	2	1	1
9.00	138	61	14	5	3	2	2	1	1	1
9.50	131	55	12	4	3	2	2	1	1	1
10.00	126	50	11	4	2	2	2	1	1	1
10.50	118	46	10	3	2	1	1	1	1	1
11.00	110	42	8	3	2	1	1	1	1	1
11.50	103	39	8	3	2	1	1	1	1	1
12.00	98	36	7	2	2	1	1	1	1	1

$\beta$ tg $\gamma$	45.	60.	75.	90.	105.	120.	135.	150.	165.	180.
.00	282	282	282	282	282	282	282	282	282	282
.25	295	280	262	253	247	241	237	231	230	228
.50	271	242	209	196	189	184	180	177	176	175
.75	218	182	153	142	138	135	132	130	130	130
1.00	156	126	106	97	94	94	93	94	94	95
1.25	115	91	76	71	68	68	69	70	71	72
1.50	83	67	56	53	52	52	53	54	55	55
1.75	63	50	42	40	39	40	41	42	43	44
2.00	46	37	32	30	30	30	31	32	33	34
2.50	28	23	20	19	19	19	20	21	23	23
3.00	17	14	13	12	12	13	14	14	15	16
3.50	12	10	9	8	9	9	10	10	12	12
4.00	9	7	6	6	6	7	8	8	9	9
4.50	7	6	6	5	5	6	6	7	7	8
5.00	5	5	5	4	4	5	5	5	6	6

r-table for standard surface N4  
 $Q_0 = 0,080$      $S_1 = 1,61$      $S_2 = 2,84$

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CR515523 MR. DUANGYOT TANGSHEWINSIRIKUL
C      PROGRAM STAM
0001      COMMON LIN,LCUT,PT,PIHAF,FAPOG
0002      COMMON RND,LANE,WLANE,WC
0003      COMMON ROBS,SOBS,FCMIN,DFC,NFC,SCMIN,DSC,NSC
0004      COMMON TRFF(20,20),TAUG(20),BETA(20)
0005      COMMON IRON,U,DLUM,GGC(4,2)
0006      COMMON LUMBR,VH1,STIV,COSV,AN12,AN21,AN22,AN31,AN32,PHI,FACTH
0007      COMMON LIGHT(26,52),CPL(52),CONE(36)
0008      COMMON ALUM(20,20)
0009      COMMON JOBS,ORCAL(5,7),NRCAL(5)
0010      COMMON ISYM,IGLAR,WMEAN,COULR,AREAL
C
C      DEFINITION OF VARIOUS CONSTANT
C
0011      CALL CONSB
C
C      INPUT GEOMETRICAL AND OTHER DATA
C
0012      CALL INPU2
C
C      INPUT R_AND T TABLES
C
0013      CALL RTNP3
0014      CALL LTNP3
C
C      OUTPUT GEOMETRICAL AND OTHER DATA ON LIST DEVICE
C
0015      CALL OUT 13
C
C      COMPUTE AND OUTPUT OF ILLUMINANCE DISTRIBUTION
C      AND ILLUMINANCE CHARACTERISTICS
C
0016      FCMIN=FBICAL(1,2)
0017      DFC=DFICAL(1,3)
0018      NFC=NRICAL(1)
0019      CALL ILLU1
C
C      FOR EACH OBSERVER POSITION AND CORRESPONDING CALCULATION
C      POINTS
C      1.COMPUTE LUMINANCE DISTRIBUTION(CALL DIST3)
C      2.OUTPUT DISTRIBUTION(CALL OUT23)
C      3.COMPUTE AND OUTPUT QUALITY CHARACTERISTICS
C      4.COMPUTE AND OUTPUT GLARE NUMBERS(CALL GLAP3)
C
0020      DO 10 J=1,NORS
0021      ROBS=ORICAL(J,1)
0022      FCMIN=FBICAL(J,2)
0023      DFC=DFICAL(J,3)
0024      NFC=NRICAL(J)
0025      CALL DIST3
0026      TFINRC=1) 9,9,8
0027      9 CALL OUT23
0028      9 CALL QUAL3

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0029      IF (IGLARS (NFC=1)) 10,10,11
0030      11 CALL GLAR 3
0031      10 CONTINUE
0032      STOP
0033      END

0001      SUBROUTINE INPU 2
0002      DIMENSION A(5)
0003      COMMON LIN,ICUT,PI,PIHAF,FAPOG
0004      COMMON RND,LANE,WLANE,WC
0005      COMMON NOBS,SCRS,FCMTN,DRC,NRC,SCMTN,DCC,NSC
0006      COMMON IFFF(29,20),TANG(29),BETA(20)
0007      COMMON NROW,H,DLUM,GFO(4,2)
0008      COMMON LNUMB,VHT,STNV,CCSV,AN12,AN21,AN23,AN31,AN33,PHI,FAOM
0009      COMMON LIGHT(36,52),CPL(52),CONE(36)
0010      COMMON ALUM(20,20)
0011      COMMON NOBS,CRCZL(5,2),NFCAL(5)
0012      COMMON ISYM,IGLAF,WMEAN,COULP,AREAL
0013      IFFF=0
0014      NOBS=0
0015      NFCM=20
0016      NSCM=20
0017      NOBSM=5
0018      ISW1=0
0019      ISW2=0
0020      ISW3=0
0021      IGLAR=0
0022      EPSIL=0.001
0023      1000 FFAD(LIN,1001)ITYP,(* (J),J=1,5)
0024      1001 FORMAT(I2,5F7.2)
0025      WRITE(LOUT,1001)ITYP,(* (J),J=1,5)
0026      IF(ITYP)71,10,7
0027      7 IF(ITYP=5)8,60,71
0028      8 GO TO (20,30,40,50),ITYP
C
C      ITYP=1 ROAD DESCRIPTION
C
0029      20 RND=A(1)
0030      ALANE=A(2)
0031      LANE=IFIX(ALANE)
0032      WLANE=A(3)
0033      WC=A(4)
0034      NC=5
0035      IF(A(5))21,22,21
0036      21 NC=3
0037      22 ISW1=1
0038      GO TO 1000
C
C      ITYP =2 LIGHTING GEOMETRY
C
0039      30 H=A(1)
0040      DLUM=A(2)
0041      PA1=A(3)

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0042      PA2=A(4)
0043      SW=A(5)
0044      ISW2=1
0045      GO TO 1000
C
C      ITYP=3 LUMINAIRE CONSTANTS
C
0046      40 LMUMB=IFIX(A(1))
0047      VHI=A(2)
0048      PHI=A(3)
0049      FACH=A(4)
0050      SINV=SIN(PAPDG*VHI)
0051      COSV=COS(PAPDG*VHI)
0052      ISWB=1
0053      GO TO 1000
C
C      ITYP=4 OBSERVATION AND CALCULATION GEOMETRY(OPTIONAL)
C
0054      50 NOBS=NOBS+1
0055      IF(NOBS=NOBSM)51,51,52
0056      52 NOBS=NOBS-1
0057      CALL ERROR(11,LCUT)
0058      GO TO 1000
0059      51 ORCAL(NOBS,1)=A(1)
0060      ORCAL(NOBS,2)=A(2)
0061      ORCAL(NOBS,3)=A(3)
0062      IF(A(3))53,53,54
0063      53 NPCAL(NOBS)=1
0064      GO TO 1000
0065      54 NPCAL(NOBS)=1E1X((A(4)-A(2))/A(3)+1.00E )
0066      GO TO 1000
C
C      ITYP=5 SLAFF CALCULATION WILL BE INCLUDE
C
0067      60 IGLAR=1
0068      COULR=A(1)
0069      APFAL=A(2)
0070      GO TO 1000
C
C      ITYP=0 TERMINATION OF GEOMETRICAL INPUT
C
0071      10 CONTINUE
C      IS ANY OF THE RECORDS TYPE1,2,OR3 MISSING?
C      IF YES ERROR MESSAGE 12 AND STOP
0072      IF(ISW1*ISW2*ISW3)70,70,80
0073      70 IFFF=1
0074      CALL ERROR(12,LCUT)
0075      GO TO 700
0076      71 IFFF=1
0077      CALL ERROR(13,LCUT)
C
C      INTERPRETATION OF INPUT

```

```

C
C      1. GEOMETRICAL ARRANGMENT OF LUMINATED
C
0078      80 NCAF=1
0079      ROAD1=C.5*AI AND RWLANE
0080      GFD(1,1)=PA1
0081      GFD(1,3)=60.0
0082      NROW=1
0083      D=PA1-ROADM

0084      IF (ABS(D)-EPSIL) 110,110,105
0085      105 IF(D)100,110,120
0086      100 GFD(1,2)=-1.0
0087      IF(PA2)140,140,130
0088      110 GFD(1,2)=1.0
0089      GO TO 140
0090      120 GFD(1,2)=1.0
0091      GO TO 140
C      TWO ROWS
0092      130 NROW=2
0093      GFD(2,1)=PA2
0094      GFD(2,2)=1.0
C      STAGGERED?
0095      IF(SW)160,160,170
0096      170 GFD(2,3)=60.0+C.5*DLUM
0097      GO TO 140
0098      160 GFD(2,3)=60.0
C      CENTRAL RESERVE ? IF YES GENERATE SYMMETRICAL ARRANGMENT
0099      140 IF(WC)300,300,100
0100      190 NPI=NROW
0101      NCAF=2
0102      CENTM=-0.5*WC
0103      DO 200 J=1,NPI
0104      IF (ABS(GFD(J,1)-CENTM)-EPSIL)200,200,210
0105      210 NROW=NROW+1
0106      GFD(NROW,1)=-WC-GFD(J,1)
0107      GFD(NROW,2)=-1.*GFD(J,2)
0108      GFD(NROW,3)=GFD(J,3)
0109      200 CONTINUE
C
C      2. POSITIONS OF OBSERVERS AND CALCULATION FIELDS.
C      IF THE TRANSVERSE POSITION HAS BEEN DEFINED
C      THROUGH TYPE 4 RECORDS, ONLY THE LONGITUDINAL
C      POSITION ARE CALCULATED
0110      300 SOBS=0.0
0111      SCMIN=60.0
0112      NSC=10
0113      DSC=).1*DLUM
0114      IF(DSC<5.001)310,310,320
0115      320 W=DLUM/5.
0116      NSC=IFIX(W)

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```

0117      W=DLUM-5.0*FLCAT(NSC)
0118      IF(ABS(W)-EPS11)325,325,325
0119      325 NSC=NSC+1
0120      325 DSC=DLUM/FLCAT(NSC)
0121      IF(NSC-NSCM)310,310,345
0122      345 IERF=1
0123      CALL FPRDF(5,LOUT)
0124      310 IF(NOBS)330,330,500
0125      330 NOBS=LANE+1
0126      IF(NCAF=1)350,350,360
0127      350 IF(LANE=2)380,370,380
0128      380 NOBS=(LANE+1)/2+1
0129      GO TO 360

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```

0130      370 NOBS=1
0131      360 ORCAL(1,1)=0.25*WLANE*WLANE
0132      ORCAL(1,2)=WLANE/FLCAT(NSC)
0133      ORCAL(1,2)=0.5*ORCAL(1,2)
0134      NFCAL(1)=NC*LANE
0135      IF(NOBS=1)500,500,390
0136      390 IF(NOBS-NOBSM)400,400,410
0137      410 CALL FPRDF(11,LOUT)
0138      NOBS=5
0139      400 W=0.5*WLANE
0140      DO 240 J=2,NOBS
0141      W=W+WLANE
0142      ORCAL(J,1)=W
0143      ORCAL(J,2)=W
0144      ORCAL(J,2)=0
0145      NFCAL(J)=1
0146      240 CONTINUE
0147      500 DO 490 J=1,NOBS
0148      IF(NRCAL(J)-NRCM)490,490,480
0149      480 IERF=1
0150      CALL FPRDF(4,LOUT)
0151      490 CONTINUE
C
0152      700 IF(IERF)800,800,710
0153      710 CALL FPRDF(8,LOUT)
0154      STOP
0155      800 RETURN
0156      END

```

```

0001      SUBROUTINE CUT12
0002      COMMON LTN,LOUT,PT,PIHAF,FAPDG
0003      COMMON ENO,LANE,WLANE,WC
0004      COMMON ROBS,SOBS,FCMIN,DFC,NFC,SCMIN,DSC,NSC
0005      COMMON IERF(20,20),TANG(20),BETA(20)
0006      COMMON NFDW,H,DLUM,SEC(4,2)
0007      COMMON LNUMB,VH1,SINV,COSV,AN2,AN21,AN23,AN21,AN23,PHI,FACM
0008      COMMON LIGHT(26,53),CPL(53),CONE(26)
0009      COMMON ALUM(20,20)

```

```

0010 COMMON NOBS,ORCAL(5,3),NECAL(5)
0011 COMMON ISYM,IGLAR,WMEAN,OCULR,AREAL
C
C THE ROUTINE OUTPUTS AN EDITED LIST OF THE INPUT DATA
C
0012 WRITE(LOUT,*)
0013 10 FORMAT(14H,25H CIE (104.6) STANDARD PROGRAM,/,
11X,29(3H*)///,
217H ROAD DESCRIPTION,/,
31X,17(3H_)//)
0014 I=1
0015 IF(WC)20,20,25
0016 25 I=2
0017 20 WRITE(LOUT,100)I
0018 WRITE(LOUT,101)LANE
0019 WRITE(LOUT,102)WLANE
0020 IF(I=1)35,35,45
0021 45 WRITE(LOUT,103)WC
0022 100 FORMAT(20H NO. OF CARRIAGEWAYS,13X,12)
0023 101 FORMAT(30H NO. OF LANES PR. CARRIAGEWAY,3X,12)
0024 102 FORMAT(14H WIDTH OF LANE,16X,F5.2,2H M)
0025 103 FORMAT(25H WIDTH OF CENTRAL RESERVE,5X,F5.2,2H M)
0026 35 WRITE(LOUT,104)FNC
0027 104 FORMAT(1X,/,42H REFLECTION PROPERTIES GIVEN BY R-TABLE NO,F9.3,
0028 WRITE(LOUT,40)NROW
0029 40 FORMAT(22H LIGHTING INSTALLATION,/,
11X,22(3H_)//,
227H THE INSTALLATION COMPRISES,13,21H ROW(S) OF LUMINAIRES,/)
0030 WRITE(LOUT,105)LNUMB
0031 WRITE(LOUT,106)VH1
0032 WRITE(LOUT,107)PHT
0033 WRITE(LOUT,108)FACH
0034 WRITE(LOUT,109)H
0035 WRITE(LOUT,110)DLUM
0036 105 FORMAT(6X,21H LIGHT DISTRIBUTION NO,16)
0037 106 FORMAT(6X,14H TILTING ANGLE,10X,F6.2,9H DEGREES)
0038 107 FORMAT(6X,22H LUMINOUS FLUX OF LAMP,F9.3,12H KILO-LUMENS)
0039 108 FORMAT(6X,19H MAINTENANCE FACTOR,6X,F6.3)
0040 109 FORMAT(6X,21H HEIGHT OF SUSPENSION,2X,F6.2,2H M)
0041 110 FORMAT(6X,18H LUMINAIRE SPACING,5X,F7.2,3H M)
0042 WRITE(LOUT,111)
0043 111 FORMAT(6X,17H POSITION OF ROWS,/,6X,
141H RELATIVE TO LEFTHAND EDGE OF CARRIAGEWAY//6X,
232H ROW NO POSITION C-O PLANE,/,15X,
320H (METERS) POINTS,/)
C
0044 IFLAG=0
0045 DO 3 J=1,NROW
0046 W1=GF0(1,1)
0047 W2=GF0(1,2)
0048 W3=GF0(1,3)
0049 IF(W3=67.0)55,55,50
0050 50 IFLAG=1

```



```

0051 55 IF(K2)61,60,70
0052 60 WRITE(L OUT,115)J,W1
0053    GO TO 30
0054 70 WRITE(L OUT,116)J,W1
0055 115 FORMAT(10X,11,6X,F6.2,5X,17H TOWARDS OBSERVER)
0056 116 FORMAT(10X,11,6X,F6.2,5X,19H AWAY FROM OBSERVER)
0057 20 CONTINUE
0058    IF(ISTAG)71,71,80
0059 90 WRITE(L OUT,117)
0060 117 FORMAT(1X//6X,29H THE ARRANGEMENT IS STAGGERED)
0061 71 IF(IGLAR)80,80,70
0062 72 WRITE(L OUT,118)
0063 119 FORMAT(1X//18H GLARE CALCULATION/,1X,18(1H_)/)
0064    WRITE(L OUT,120)AREAL,COULF
0065 120 FORMAT(6X,25H FLASHED AREA OF LUMINAIRE,F10.3,6H SQ-M/
    16X,13H COULF FACTOR,12X,F10.3//)
0066 80 RETURN
0067    END

```

```

0001 SUBROUTINE FINPE
0002 COMMON LIN,LOUT,PI,PIHAF,FAPDG
0003 COMMON RND,LANE,WLANE,WC
0004 COMMON ROBS,SOBS,FCHTN,DFC,NRC,SCMTN,DSC,NSC
0005 COMMON IFFF(29,20),TANG(29),BETA(20)
0006 COMMON NFOV,H,DLUM,CFC(4,2)
0007 COMMON LNUMB,VH1,STNV,COSV,AN12,AN21,AN23,AN31,AN32,PHI,FACH
0008 COMMON LIGHT(26,52),CPL(52),CONE(26)
0009 COMMON ALUM(20,20)
0010 COMMON NOBS,ORCAL(5,2),NECAL(5)
0011 COMMON ISYM,IGLAR,WMEAN,COULR,AREAL

```

```

C
C INPUT OF F-TABLE
C IF WRONG ID-NUMBER FERRF-MESSAGE 9 AND STOP
C

```

```

0012 DO 10 J=1,20
0013 DO 10 I=1,29
0014 10 IFFF(I,J)=0
0015 READ(LIN,25)FNOX
0016 25 FORMAT(F7.2)
0017 WRITE(L OUT,25)FNOX
0018 IF(FNO-RNOX)15,20,15
0019 20 DO 25 J=1,20
0020 NUMB=29
0021 READ(LIN,40)(IFFF(I,J),I=1,NUMB)
0022 WRITE(L OUT,40)(IFFF(I,J),I=1,NUMB)
0023 25 CONTINUE
0024 40 FORMAT(17I4)
0025 RETURN
0026 15 CALL FERRF(9,LOUT)
0027 STOP
0028 END

```

```

0001 SUBROUTINE IIMP3
0002 COMMON LIN,LOUT,PI,PIHAF,PAPOG
0003 COMMON RND,LANE,WLANE,WC
0004 COMMON ROBS,SCBS,FCMIN,DFC,NRC,SCMIN,DSC,NSC
0005 COMMON TREF(29,20),TANG(29),BETA(20)
0006 COMMON NROW,H,DLUM,GFC(4,2)
0007 COMMON LNUMB,VH1,SNV,COSV,AN12,AN21,AN23,AN31,AN32,PHI,FACH
0008 COMMON LIGHT(26,52),CPL(53),CONF(26)
0009 COMMON ALUM(20,20)
0010 COMMON NOBS,ORCAL(5,2),NRCAL(5)
0011 COMMON ISYM,IGIAP,WMEAN,COULR,ARFAL

C
C INPUT OF LIGHT DISTRIBUTION WITH ID-NUMBER LNUMB
C
C IW:ID-S(MUST EQUAL LNUMB)
C ISYM: SYMETRI-CODE(MUST EQUAL 1 OR 0)
C IGRID: CODE FOR MEASURING GRID(MUST EQUAL
C 0,,CORRESPONDING TO THE STANDARD CIE-GRID)
C
0012 READ(LIN,25)IW,ISYM,IGRID
0013 25 FORMAT(17I4)
0014 WRITE(LOUT,25)IW,ISYM,IGRID
0015 IF(IW=LNUMB)10,20,10
0016 20 IF(IGRID)10,20,10
0017 20 IW1=36
0018 IF(ISYM)10,40,50
0019 40 IW2=52
0020 GO TO 60
0021 50 IF(ISYM=1)10,70,10
0022 70 IW2=27
0023 60 READ(LIN,25)((LIGHT(I,J),J=1,IW2),I=1,IW1)
0024 WRITE(LOUT,25)((LIGHT(I,J),J=1,IW2),I=1,IW1)
0025 IF(ISYM)80,80,90
0026 90 IW2=53
0027 DO 100 J=2,26
0028 IW2=IW2-1
0029 DO 100 I=1,IW1
0030 100 LIGHT(I,IW2)=LIGHT(I,J)
0031 80 RETURN
0032 10 CALL EFFCO(10,LOUT)
0033 STOP
0034 END

```

```

0001 SUBROUTINE ILLUM
0002 DIMENSION FLUM(20,20),W(10)
0003 COMMON LIN,LOUT,PI,PIHAF,PAPOG
0004 COMMON RND,LANE,WLANE,WC
0005 COMMON ROBS,SCBS,FCMIN,DFC,NRC,SCMIN,DSC,NSC
0006 COMMON TREF(29,20),TANG(29),BETA(20)
0007 COMMON NROW,H,DLUM,GFC(4,2)
0008 COMMON LNUMB,VH1,SNV,COSV,AN12,AN21,AN23,AN31,AN32,PHI,FACH
0009 COMMON LIGHT(26,52),CPL(53),CONF(36)

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```

0010 COMMON ALUM(20,20)
0011 COMMON JOBS,ORCAL(5,2),NECAL(5)
0012 COMMON ISYM,IGLAP,WMEAN,COULP,APCAL
0013 DO 10 I=1,20
0014 DO 10 J=1,20
0015 10 FLUM(I,J)=0.0
0016 YAMIN=50.0+5.*H
0017 YAMAX=50.0+DLUM+12.0*H
0018 FFAC=PI*FACM/(H*H)
0019 C BEGINNING OF EDW-LOOP
0019 DO 100 JF=1,NECW
0020 XA=GF1(JF,1)
0021 YAT=GF1(JF,2)
0022 W1=GF1(JF,3)
0023 AN12=V1
0024 AN21=-W1*SINV
0025 AN23=-COSV
0026 AN31=-W1*COSV
0027 AN33=SINV
0028 YA=YA1-DLUM*FLCAT(I,FTX((YAT-YAMIN)/DLUM)+1)
0029 C BEGINNING OF LUMINATEE-LOOP
0029 500 YA=YA+DLUM
0030 IF(YA-YAMAX)130,130,400
0031 C BEGINNING OF CALCULATION POINT LOOP
0031 130 XCLUM=RCMIN-DPC-XA
0032 DO 60 JRC=1,NFC
0033 XCLUM=XCLUM+DPC
0034 YCLUM=SCMIN-DSC-YA
0035 DO 60 JSC=1,NSC
0036 YCLUM=YCLUM+DSC
0037 CALL FIB3(XCLUM,YCLUM,FT,GAM)
0038 W4=CAND3(FT,GAM)
0039 W5=(H/S)*FT*(H*H+XCLUM*XCLUM+YCLUM*YCLUM)**2
0040 W2=FFAC*W4*W5
0041 FLUM(JRC,JSC)=FLUM(JFC,JSC)+W2
0042 600 CONTINUE
0043 GO TO 500
0044 400 CONTINUE
0045 100 CONTINUE
0046 IW = 23-NRC
0047 NBLOC = NSC/10
0048 NEFM = NSC - 10 * NBLOC
0049 IF (NREM) 20,20,30
0050 30 NBLOC=NBLOC+1
0051 GOTO 40

```

```

0052 20 NREM = 10
0053 40 DO 50 J3 = 1,NBLOC
0054 J1 = 10*(J3-1)+1
0055 IF (J3-NBLOC) 60,70,60
0056 70 J2 = J1 - 1 + NREM
0057 IW2 = JREM
0058 GOTO 10

```

```

0059 60 IW2 = 1)
0060 J2 = J1 + 9
0061 80 K = 1
0062 DO 90 I=J1,J2
0063 K = K+1
0064 90 W(K) = SCMIN + DSC*FLCAT(J=1)
0065 WRITE(LJUT,11)
0066 11 FORMAT(1H1,1X,26H HORIZONTAL ILLUMINANCE DISTRIBUTION,
1/,2X,35(1H-),///)
0067 WRITE(LJUT,22)(W(J),J=1,K)
0068 22 FORMAT(3X,5H = / S,1X,1CF6.1)
0069 WRITE(LJUT,32)
0070 32 FORMAT(1/,1X,71(1H-))
0071 DO 111 J=1,NFC
0072 Z1=FC IIN+DEC*FLCAT(J-1)
0073 111 WRITE(LJUT,44)Z1,(FLUM(J,I),I=J1,J2)
0074 44 FORMAT(1/,1X,F6.2,2H %,1CF6.2)
0075 WRITE(LJUT,33)
0076 50 CONTINUE
0077 ZUM=0.)
0078 BIG=1).0**30
0079 FMIN=3IG
0080 FMAX=-3IG
0081 DO 211 I=1,NFC
0082 DO 211 J=1,NSC
0083 Z=FLU1(I,N)
0084 ZUM=Z/J1+Z
0085 IF(FMIN-Z)322,322,333
0086 333 FMIN=Z
0087 322 IF(FMAX-Z)444,211,211
0088 444 FMAX=Z
0089 211 CONTINUE
0090 FMEAN=ZUM/FLD/T(NFC*NSC)
0091 U1 =FMIN/FMEAN
0092 U2 =FMAX/FMEAN
0093 WRITE(LJUT,66)
0094 WRITE(LJUT,77)FMEAN
0095 WRITE(LJUT,88)FMIN
0096 WRITE(LJUT,99)FMAX
0097 WRITE(LJUT,111)U1
0098 WRITE(LJUT,222)U2
0099 66 FORMAT(1H1,1X,39H QUALITY CHARACTERISTICS OF ILLUMINANCE,
1/,2X,38(1H-),///)
0100 77 FORMAT(3X,6H FMEAN,10X,2H =,F7.2,5H LUX,/)
0101 88 FORMAT(3X,5H FMIN,11X,2H =,F7.2,5H LUX,/)
0102 99 FORMAT(3X,5H FMAX,11X,2H =,F7.2,5H LUX,/)
0103 1111 FORMAT(3X,12H FMIN / FMEAN,3X,2H =,F7.2,/)
0104 222 FORMAT(3X,12H FMIN / FMAX,4X,2H =,F7.2)
0105 FETUR'I
0106 END

```

```

0001 SUBROUTINE DIST2
0002 COMMON LIN,LCUT,PI,PIHAF,FAPOG
0003 COMMON RND,LANE,WLAF,WL
0004 COMMON ROBS,SOBS,FCMIN,DSC,NFC,SCMIN,DSC,NFC
0005 COMMON IFFF(29,20),TANG(29),BETA(20)
0006 COMMON NFDW,H,DLUM,GEO(4,2)
0007 COMMON LNUMP,VH1,SINV,COSV,AN12,AN21,AN23,AN31,AN32,PHT,FACM
0008 COMMON LIGHT(26,52),CPL(53),CONE(36)
0009 COMMON ALUM(20,20)
0010 COMMON JOBS,CRCAL(5,2),NFCAL(5)
0011 COMMON ISYM,TGLAF,WMEAN,COLUR,AREAL
0012 DO 50 J=1,20
0013 DO 50 I=1,20
0014 50 ALUM(I,J)=0.0
0015 YAMIN=60.0-5.*H
0016 YAMAX=60.0+DLUM+12.0*H
0017 FAC=PHT*FACM/10.0**4/(H*H)
C BEGINNING OF FOR-LOOP
0018 DO 100 JF=1,NFDW
0019 XA=GEO(JF,1)
0020 YA1=GEO(JF,2)
0021 W1=GEO(JF,2)
0022 AN12=W1
0023 AN21=-W1*SINV
0024 AN23=-COSV
0025 AN31=-W1*COSV
0026 AN32=SINV
0027 YA=YA1-DLUM*FLOAT(IFIX((YA1-YAMIN)/DLUM)+1)
C BEGINNING OF LUMINATEF-LOOP
0028 500 YA=YA+DLUM
0029 IF(YA-YAMAX)130,130,400
C BEGINNING OF CALCULATION POINT LOOP
0030 130 XCBS=ROBS-FCMIN+DSC
0031 XCLUM=RDMIN-DSC-XA
0032 DO 600 JPC=1,NFC
0033 XCBS=XCBS-DSC
0034 XCLUM=XCLUM+DSC
0035 YCBS=SOBS-SCMIN+DSC
0036 YCLUM=SCMIN-DSC-YA
0037 DO 600 JSC=1,NFC
0038 YCBS=YCBS-DSC
0039 YCLUM=YCLUM+DSC
0040 CALL FIGA3(XCLUM,YCLUM,FT,GAM)
0041 CALL BETG3(XCLUM,YCLUM,XCBS,YCBS,TGAM,RET)
0042 W4=CAND3(FT,GAM)
0043 W5=EVAL3(TGAM,RET)
0044 W1=FAC*W4*W5
0045 ALUM(JPC,JSC)=ALUM(JPC,JSC)+W1
0046 600 CONTINUE
0047 GO TO 500
0048 400 CONTINUE
0049 100 CONTINUE
0050 RETURN
0051 END

```

```

0001 SUBROUTINE GEN(ANGLS,NZON,NZ,DZ,FAC)
0002 DIMENSION NZ(5),DZ(5),ANGLS(52)
0003 IZ=1
0004 ANG=0.0
0005 ANGLS(1)=ANG
0006 DO 10 J=1,NZON
0007 NZZ=NZ(J)
0008 DZZ=DZ(J)
0009 DO 10 I=1,NZZ
0010 ANG=ANG+DZZ
0011 IZ=IZ+1
0012 10 ANGLS(IZ)=FAC*ANG
0013 RETURN
0014 END

```

```

0001 SUBROUTINE BETGB(PX,PY,FOBSX,FOBSY,TGAM,BET)
0002 COMMON LIN,LOUT,PI,PIHAF,FAPDG
0003 COMMON RND,LANE,WLANE,WC
0004 COMMON ROBS,SOBS,FCMIN,DRC,NRC,SCMIN,DSC,NSC
0005 COMMON TFF(29,20),TANG(29),BETA(20)
0006 COMMON NPOW,H,DLUM,GFC(4,3)
0007 COMMON LNUMB,VIII,SINV,CCSV,AN12,AN21,AN23,AN31,AN32,PHI,FACM
0008 COMMON LIGHT(36,52),CPL(52),CONE(36)
0009 COMMON ALUM(20,20)
0010 COMMON NOBS,ORCAL(5,2),NECAL(5)
0011 COMMON ISYM,TGLAF,WMEAN,COULR,AREAL
C CALCULATION OF DIRECTION IN R-TABLE EXPRESSED BY BET(=BETA) &
C TGAM(=TANGENS(GAMMA))
C THEY ARE CALCULATE FROM THE VECTOR (PX,PY,-H) WHICH CONNECT THE
C LUMINAIRE AND THE CALCULATION POINT AND THE VECTORS(FOBSX,FOBSY
C WHICH CONNECTS THE CALCULATION POINT AND THE PROJECTION ON
C THE ROAD-SURFACE OF THE OBSERVER POINT.
C
0012 TGAM = SQRT(PX*PX+PY*PY)/H
0013 DENOM = FOBSX*PX + FOBSY*PY
0014 IF (DENOM) 10,20,10
0015 20 BET = PIHAF
0016 GOTO 100
0017 10 ANOM = ABS(FOBSX*PY - FOBSY*PX)
0018 BET = ATAN(ANOM/DENOM)
0019 IF (DENOM) 20,20,100
0020 20 BET = BET + PI
0021 100 RETURN
0022 END

```

```

0001 SUBROUTINE FFFOF(NUMB,LOUT)
0002 WRITE (LOUT,10) NUMB
0003 10 FORMAT(10H FFFOF NO. ,I2)
0004 RETURN
0005 END

```

```

0011 FUNCTION CANDE(FI,GM)
0012 DIMENSION W(3)
0013 COMMON LTN,LCUT,PI,PIHAF,PARPG
0014 COMMON RNO,LANE,WLANE,WC
0015 COMMON ROBS,SOBS,FCMIN,DFC,NFC,SCMIN,DFC,NSC
0016 COMMON TRFF(29,20),TANG(29),BETA(20)
0017 COMMON NFDW,H,PLUM,GEO(4,2)
0018 COMMON LNUMB,VH1,SINV,COVS,AN12,AN21,AN23,AN31,AN32,PHI,FACM
0019 COMMON LIGHT(36,52),CPL(52),CONF(36)
0011 COMMON ALUM(20,20)
0011 COMMON NCRS,ORCAL(5,2),NECAL(5)
0012 COMMON ISYM,IGLAF,WMEAN,COULF,AREAL
0013 IF(FI-PIHAF)10,20,30
0014 10 N1=2
0015 GO TO 50
0016 30 IF(FI-PI)20,40,40
0017 20 N1=14
0018 GO TO 50
0019 40 N1=27
0021 50 DO 60 J=N1,53
0021 D=CPL(J)-FI
0022 IF(D)60,61,70
0023 60 CONTINUE
0024 J=53
0025 70 IF(D-(CPL(J)-CPL(J-1))/2.)80,80,90
0026 80 I=J-1
0027 GOTO 100
0028 90 I=J-2
0029 100 IF(I)110,110,120
0031 110 I1=52
0031 I2=I
0032 GO TO 150
0033 120 IF(I-51)130,140,120
0034 140 I1=51
0035 I2=52
0036 I3=1
0037 GO TO 160
0033 130 I1=I
0039 I2=I1+1
0040 150 I2=I2+1
0041 160 DX1=CPL(I2)-CPL(I1)
0042 DX2=CPL(I3)-CPL(I2)
0043 DX=FI-CPL(I1)
0044 GAMMA
0044 DO 200 J=2,36
0045 D=CONF(J)-GM
0046 IF(D)200,200,210
0047 200 CONTINUE
0048 J=36
0049 210 IF(D-(CONF(J)-CONF(J-1))/2.)220,220,230
0050 220 I=J-1
0051 GOTO 250
0052 230 I=J-2
0053 IF(I)240,240,250

```

```

0054 240 I=1
0055      GO TO 250
0056 250 IF(I=35)260,270,270
0057 270 I=24
0058 260 DO 280 J=1,3
0059      IG=J-1+I
0060      Y1=LIGHT(IG,I1)
0061      Y2=LIGHT(IG,I2)
0062      Y3=LIGHT(IG,I3)
0063      W(J)=AIPOL(I,DX,DX1,DX2,Y1,Y2,Y3)
0064 280 CONTINUE
0065      DX1=CONF(I+1)-CONF(I)
0066      DX2=CONF(I+2)-CONF(I+1)
0067      DX=GM-CONF(I)
0068      CAND3=AIPOL(I,DX,DX1,DX2,W(1),W(2),W(3))
0069      RETURN
0070      END

```

```

0001  FUNCTION AIPOL (ISW,X,DX1,DX2,Y1,Y2,Y3)
C
C   IF ISW<=0:LINEAR INTERPOLATION ELSE QUADRATIC
C
C   THE INTERPOLATION CURVE IS DRAWN THROUGH THE FOLLOWING
C   TWO OR THREE POINTS :(0,Y1),(DX1,Y2),(DX1,DX2,Y3)
C
0002  IF (ISW)10,10,20
0003  10  AIPOL=Y1+X*(Y2-Y1)/DX1
0004      RETURN
0005  20  W=(Y3-Y1)*DX1*(X-DX1)+(Y2-Y1)*(DX1+DX2)*(DX1+DX2-X)
0006      AIPOL=Y1+X*W/((DX1+DX2)*DX1*DX2)
0007      RETURN
0008      END

```

```

0001  FUNCTION EVAL 3 (TGAM,BT)
0002  DIMENSION W(3)
0003  COMMON LIN,LCUT,PI,PIHAF,FAPOG
0004  COMMON RNO,LANE,WLANE,WC
0005  COMMON ROBS,SOBS,FCMIN,DFC,NFC,SCMIN,DSC,NSC
0006  COMMON IFFF(20,20),TANG(20),BETA(20)
0007  COMMON NROW,H,DLUM,CFC(4,2)
0008  COMMON LHUMB,VH1,STMV,CCSV,AN12,AN21,AN22,AN31,AN32,PHI,FAOM
0009  COMMON LIGHT(26,52),CPL(52),CONF(36)
0010  COMMON ALUM(20,20)
0011  COMMON NOBS,CRCAL(5,2),NRCAL(5)
0012  COMMON ISYM,IGLAF,WMEAN,COULE,AREAL

```

```

C
C   CALCULATION OF F-VALUE FOR TANGENS (GAMMA)=TGAM AND BETA=BT
C   THE INTERPOLATION PROCEDURE USED IS QUADRATIC (TYPE 3) EXCEPT
C   AT THE LOWER EDGE OF THE TABLE WHERE LINEAR INTERPOLATION IS USED
C   FURTHER, THE INTERPOLATION CURVES FOR CONSTANT TGAM WILL NEVER CROSS
C   THE BETA = 100 DEGREE = LIMIT
C

```



```

0013      DO 10 J=1,20
0014      IF(BETA(J)-B1)10,10,30
0015      10 CONTINUE
0016      J=20
0017      20 IG=J-1
0018      DO 50 J=1,20
0019      D=TANG(I)-TGAM
0020      IF(D)50,50,60
0021      50 CONTINUE
0022      IF(D)11,90,90
0023      90 J=20
0024      60 IT=J-1
0025      IF(IT-14)110,120,120
0026      120 IF(IG-7)130,140,140
0027      130 IF(IT-13)120,150,150
0028      150 IF(IG-4)160,140,140
0029      160 IF(IT-23)110,140,140
0030      110 ISW=1
0031      N=2
0032      IF(IG-19)180,170,170
0033      170 IG=IG-1
0034      GO TO 130
0035      140 ISW=-1
0036      N=2
0037      180 TX=TGM-TANG(IT)
0038      TX1=TAIG(IT+1)-TANG(IT)
0039      BX=BT-BETA(IG)
0040      BX1=BETA(IG+1)-BETA(IG)
0041      IF(IS)300,200,310
0042      310 TX2=TAIG(IT+2)-TANG(IT+1)
0043      200 BX2=BETA(IG+2)-BETA(IG+1)
0044      300 DO 200 J=1,N
0045      I=J-1+IG
0046      Y1=IREF(IT,I)
0047      Y2=IREF(IT+1,I)

```

```

0043      IF(ISW)320,220,220
0044      330 Y3=IREF(IT+2,I)
0045      220 W(J)=AIPOL(TSP,TX,TX1,TX2,Y1,Y2,Y3)
0051      200 CONTINUE
0052      FVAL3=AIPOL(ISW,BX,BX1,BX2,W(1),W(2),W(3))
0053      RETURN
0054      100 FVAL3=0.0
0055      RETURN
0056      END

```

```

0001      SUBROUTINE CONS 2
0002      DIMENSION NZ(5),DZ(5)
0003      COMMON LIN,LOUT,PI,PIHAF,PAPDG
0004      COMMON RND,LANE,WLANE,WC
0005      COMMON ROBS,SORS,FCMIN,DEC,NRC,SCMIN,DEC,NSC
0006      COMMON IREF(29,20),TANG(29),BETA(20)
0007      COMMON NROW,H,PLUM,GFC(4,3)

```

```

0008 COMMON LNINR,VIH,STIV,COEV,AN12,AN21,AN23,AN31,AN33,PHT,FACM
0009 COMMON LIGHT(26,52),CPL(53),CONF(26)
0010 COMMON ALUM(20,20)
0011 COMMON UCBS,ORCAL(5,2),NECAL(5)
0012 COMMON ISYM,TGLAF,WMEAN,COULP,AREAL
C
C      DEFINITION OF VARIOUS CONSTANTS
C
C      TANG(20) AND BETA(20) CONTAIN THE MEASURING GRID OF THE R-TABL
C      THE BETA-VALUES IN RADIAN
C
C      CPL(53) AND CONF(26) CONTAIN THE MEASURING GRID OF
C      THE LIGHT DISTRIBUTION
C
C      LIN AND LOUT ARE THE LOGICAL NUMBERS OF THE
C      INPUT AND OUTPUT UNITS RESPECTIVELY
C
0013 PI=3.141593
0014 RAPDG=PI/180.
0015 LTN=1
0016 LOUT=3
0017 PIHAF=PI/2.
C      VALUES OF TANGENS (GAMMA)
0018 NZON=2
0019 NZ(1)=3
0020 NZ(2)=20
0021 DZ(1)=1.25
0022 DZ(2)=1.50
0023 FAC=1.
0024 CALL GEN(TANG,NZON,NZ,DZ,FAC)
C      VALUES OF BETA-ANGLE
0025 NZON=4
0026 NZ(1)=1
0027 NZ(2)=1
0028 NZ(3)=3
0029 NZ(4)=3
0030 DZ(1)=2.
0031 DZ(2)=3.
0032 DZ(3)=5.
0033 DZ(4)=15.
0034 CALL GEN(BETA,NZON,NZ,DZ,RAPDG)
C      VALUES OF C-PLANE
0035 NZON=5
0036 NZ(1)=2
0037 NZ(2)=1
0038 NZ(3)=2)
0039 NZ(4)=1
C
0040 NZ(5)=2
0041 DZ(1)=15.
0042 DZ(2)=10.
0043 DZ(3)=5.
0044 DZ(4)=1).

```

```

0045      DZ(5)=15.
0046      CALL GEN(CPL,NZCN,NZ,DZ,R/PDG)
0047      I=54
0048      DO 50 J=1,26
0049      T=I-1
0050      50 CPL(I)=2.*PI-CPL(J)
           C      VALUES OF GAMMA ANGLE
0051      NZCN=4
0052      NZ(1)=3
0053      NZ(2)=3
0054      NZ(3)=24
0055      NZ(4)=5
0056      DZ(1)=10.
0057      DZ(2)=5.
0058      DZ(3)=2.5
0059      DZ(4)=15.
0060      CALL GEN(CONE,NZCN,NZ,DZ,R/PDG)
0061      RETURN
0062      END

```

```

0001      SUBROUTINE FIGAS (FX,FY,FI,GAM)
0002      COMMON LTN,LCUT,PI,PIHAF,R/PDG
0003      COMMON RND,LANE,WLANE,WC
0004      COMMON SCRS,SCRS,FCMIN,DEC,NRC,SCMIN,DEC,NSC
0005      COMMON IREF(29,20),TANG(29),BETA(20)
0006      COMMON NPOW,H,DLUM,CFO(4,2)
0007      COMMON LNUMB,VH2,SINV,COSV,AN12,AN21,AN23,AN31,AN32,PHI,FACM
0008      COMMON LIGHT(36,52),CPL(53),CONE(36)
0009      COMMON ALUM(20,20)
0010      COMMON ICBS,CRCAL(5,2),NRCAL(5)
0011      COMMON ISYM,IGLAF,WMEAN,COULF,AREAL

```

C  
C  
C  
C  
CALCULATION OF DEFLECTION IN LIGHT-DISTRIBUTION EXPRESSED AT THE ANGLES FI (INDICATING C-PLANE) AND GAM (EQUAL TO GAMMA)

```

0012      F1 = AN12*FY
0013      F2=AN21*FX-AN22*H
0014      P2 = AN31*FX - AN32*H
0015      IF (R2) 10,20,30
0016      20 GAM = PIHAF
0017      GOTO 40
0018      10 GAM = ATAN(SQRT(F1*F1 + F2*P2)/P2)
0019      IF (R2) 30,20,40
0020      20 GAM = GAM + PI
0021      40 IF (R1) 50,60,50
0022      60 FI = PIHAF
0023      IF (R3) 70,100,100
0024      50 FI = ATAN(F2/F1)
0025      IF (R1) 70,60,80
0026      70 FI = FI + PI
0027      GOTO 100
0028      80 IF (R3) 90,100,100
0029      90 FI = FI + 2.*PI

```

```

0030 100 CONTINUE
0031     FT = FI + PTHAF
0032     FI1 = FT - 2.*PI
0033     IF (FI1) 120,110,110
0034 110 FT = FI1
0035 120 RETURN
0036     END

```

```

0001 SUBROUTINE QUAL3
0002 COMMON LTN,LOUT,PI,PTHAF,PAPOG
0003 COMMON RND,LANE,WLANE,WC
0004 COMMON ROBS,SOBS,FCMTN,DEC,NFC,SCMTN,DSC,NSC
0005 COMMON IREF(29,20),TANG(29),BETA(20)
0006 COMMON NROW,H,DLUM,GEO(4,3)
0007 COMMON LNUMB,VHI,STNV,COSV,AN12,AN21,AL123,AN31,AN33,PHI,FACM
0008 COMMON LIGHT(36,52),CPL(52),CONF(36)
0009 COMMON ALUM(20,20)
0010 COMMON JOBS,ORCAL(5,2),NECAL(5)
0011 COMMON ISYM,IGLAB,WMEAN,COULR,AREAL
0012     EPSTL=0.01
0013     W2 = RCMTN - DEC
0014     DO 15) J=1,NFC
0015     W2 = W2 + DEC
0016     W3 = ORC(SOBS-W2) EPSTL
0017     IF (W3) 160,160,150
0018 150 CONTINUE
0019     JOBS = -1
0020     GOTO 145
0021 160 JOBS = J
0022 145 SUM = 0.
0023     ALARG = 10.0**20
0024     SMALL = -ALARG
0025     WMIN = ALARG
0026     DO 10) J=1,NFC
0027     ISW = 0
0028     IF (J-JOBS) 15,20,15
0029 20 WMIN2 = ALARG
0030     WMAX = SMALL
0031     ISW = 1
0032 15 DO 10) I=1,NSC
0033     W = ALUM(J,I)
0034     SUM=SUM+W
0035     IF (WMIN=W) 25,25,30
0036 20 WMIN = W
0037 25 IF (ISW) 10,10,25
0038 35 IF (WMIN2=W) 55,55,60
0039 60 WMIN2 = W
0040 55 IF (WMAX=W) 70,10,10
0041 70 WMAX = W
0042 10 CONTINUE
0043     IF (NRC-1) 202,202,201
0044 201 WRITE (LOUT,5)
0045     5 FORMAT(1H1)

```

```

0046      WRITE(LOUT,1)
0047      1 FORMAT(37H QUALITY CHARACTERISTICS OF LUMINANCE,/,1X,36(1+))
0048      202 WRITE(LOUT,4)
0049      4 FORMAT(1X//)
0050      WRITE (LOUT,9) FCRS,SCRS
0051      9 FORMAT(23H OBSERVER POSITION: R =,F7.2,5H S =,F7.2//)
0052      IF (NRC-1) 200,200,210
0053      210 WMEAN = SUM/ELCAT(NFC*NSC)
0054      UNI = WMIN/WMEAN

```

```

0055      WRITE(LOUT,2) WMEAN
0056      WRITE(LOUT,3) UNI
0057      200 IF (JOBS) 220,220,230
0058      230 FL = WMIN2/WMAX
0059      WRITE(LOUT,6) FL
0060      2 FORMAT(5X,'AVERAGE LUMINANCE',31X,F7.2,' CD/SQ-M//)
0061      3 FORMAT(5X,'OVERALL UNIFORMITY',30X,F7.2,/)
0062      6 FORMAT(5X,'LONGITUDINAL UNIFORMITY',25X,F7.2//)
0063      220 RETURN
0064      END

```

```

0001      SUBROUTINE GLAF3
0002      DIMENSION VL(2),XD(2),YD(2)
0003      COMMON LTN,LOUT,PI,PIHCF,FAPDG
0004      COMMON RND,LANE,WLANE,WC
0005      COMMON ROBS,SCRS,FCMIN,DPC,NFC,SCMIN,DSC,NSC
0006      COMMON JEFF(20,20),TANG(20),BETA(20)
0007      COMMON NPOW,H,DLUM,GFC(4,2)
0008      COMMON LNUMB,VH1,SINV,COVS,AN12,AN21,AN23,AN31,AN32,PHI,FACM
0009      COMMON LIGHT(26,52),CPL(52),CONE(26)
0010      COMMON ALUM(20,20)
0011      COMMON NOBS,ORCAL(5,2),PRCAL(5)
0012      COMMON ISYM,TGLAF,WMEAN,COULP,AREAL

```

C CALCULATION OF DISABILITY GLAF

```

0013      ERCLS = 0.02
0014      FLOG = 0.434295
0015      HC = 1.5
0016      T20 = 20.*FAPDG
0017      NCAL = 1
0018      IF (GFC(2,2)-60.) 5,5,6
0019      6 NCAL = 2
0020      5 AFST = (H-HC)/TAN(T20)
0021      VL(1) = 0.
0022      VL(2) = 0.
0023      YD(1) = 0.
0024      YD(2) = -90.
0025      YD(3) = HC
0026      FAK = H/(H-HC)
0027      FY2 = YD(1)**2 + YD(2)**2 + YD(3)**2
0028      DO 2 NC = 1,NCAL
0029      DO 3 NR = 1,NPOW

```

```

0030      XA = GFC(NF,1)
0031      W1 = GFC(NF,2)
0032      YA1 = GFC(NF,3)
0033      AN2 = W1
0034      AN21 = -W1*SINV
0035      AN22 = -COSV
0036      AN23 = -W1*COSV
0037      AN33 = SINV
0038      XQ(1) = FOBS = XA
0039      XQ(2) = HC=H
0040      AFSTO = AFST + ABS(YA1-60.-FLCAT(NC-1))*C.5*DLUM)-DLUM
0041      NA = 0
0042      4 CONTINUE
0043      NA = NA + 1
0044      XQ(2) = -AFSTO*FLCAT(NA)*DLUM
0045      RX2 = 0.
0046      COSQ = 0.
0047      DO 10 I =1,3
0048      PX2 = FX2 + XQ(I)**2
0049      10 COSQ = COSQ + XQ(I) * YQ(I)
0050      IF (RX2-250000.) 7,7,3
0051      7 CONTINUE
0052      COSQ = COSQ/SQRT(FX2*RY2).

```

```

0053      TAETA=ATAN(SQRT((1.-COSQ)*(1.+COSQ))/COSQ)
0054      XLUM = XQ(1) * FAK
0055      YLUM = XQ(2) * FAK
0056      CALL FTGAB(XLUM,YLUM,FT,GAM)
0057      FBL = CAND3(FT,GAM)*PHI*COSQ/RX2
0058      VLNC = 3.*F.2*FBL/TAETA**2
0059      VL(NC) = VL(NC) + VLNC
0060      VLTST = VL(NC)*FDCLS - VLNC
0061      IF (VLTST) 4,4,3
0062      2 CONTINUE
0063      2 CONTINUE
0064      VLMAX = VL(1)
0065      IF (VL(1)-VL(2)) 13,14,14
0066      13 VLMAX = VL(2)
0067      14 CONTINUE
0068      TI=65.*VLMAX/(WMEAN/FACM)**0.9
0069      WRITE(LOUT,103) VLMAX
0070      103 FORMAT(5X,'VEILING LUMINANCE',28X,F10.2,' CD/SQ-M')
0071      WRITE (LOUT,104) TI
0072      104 FORMAT(5X,'THRESHOLD INCREMENT',26X,F10.2,8H PERCENT/)

```

C  
C  
C

CALCULATION OF DISCOMFORT GLARE

```

0073      IF (NROW - 1) 17,16,18
0074      18 IF (ISYM) 17,17,16
0075      17 WRITE (LOUT,102)
0076      102 FORMAT(' DISCOMFORT GLARE CANNOT BE CALCULATED')
0077      GOTO 20
0078      16 CONTINUE

```

```

0079      FT = 90.*F/PDG
0080      GAM = 80.*F/PDG
0081      A180 = GAMD2(FI,GAM)*PHI
0082      GAM = 83.*F/PDG
0083      A138 = GAMD2(FT,GAM)*PHI
0084      A1 = A180/A188
0085      G = -3.31*/LOG(A180)+0.97*ALOG(WMEAN/FACM) + 4.41*ALOG(H-H0)+
1         1.975 * SOFT(ALOG(A1))-0.08 * ALOG(A1)+1.29*ALOG(AREAL)
2         1.46 * /LOG(FLOAT(NFLOW)*1000./DLUM)
0086      G = 13.34 + FLOG * G + COULR
0087      WRITE (LOUT,101) G
0088      *01 FORMAT (5X,'DISCONTINUIT GLARE CONTROL M/RK',16X,F10.2/)
0089      20 RETURN
0090      END

```

```

0001      SUBROUTINE OUT22
0002      DIMENSION W(10)
0003      COMMON LIN,LOUT,PI,PIHAF,FAPDG
0004      COMMON RND,LANE,WLANE,WL
0005      COMMON ROBS,SOBS,FCMIN,DRC,NRC,SCMIN,DSC,NSC
0006      COMMON IREF(29,20),TANG(29),BETA(20)
0007      COMMON NFLOW,H,DLUM,GFC(4,2)
0008      COMMON LNUMB,VH1,STMV,COSV,AN12,AN21,AN23,AN31,AN35,PHI,FACM
0009      COMMON LIGHT(26,52),CPL(52),CONE(26)
0010      COMMON ALUM(20,20)
0011      COMMON NOBS,ORCAL(5,2),NRCAL(5)
0012      COMMON ISYM,IGLAR,WMEAN,COULR,AREAL
0013      IW = 29-NRC
0014      NBLOC = NSC/10
0015      NFEM = NSC - 10 * NBLOC
0016      IF (NFEM) 20,20,30
0017      30 NBLOC=NBLOC+1
0018      GOTO 40
0019      20 NFEM = 10
0020      40 DO 50 JB = 1,NBLOC
0021          J1 = 10*(JB-1)+1
0022          IF (JB-NBLOC) 60,70,60
0023          70 J2 = J1 - 1 + NFEM
0024          IW2 = NFEM
0025          GOTO 80
0026          60 IW2 = 10
0027          J2 = J1 + 9
0028          80 K = 0
0029          DO 90 J=J1,J2
0030              K = K+1
0031          90 W(K) = SCMIN + DSC*FLOAT(J-1)
0032          WRITE(LOUT,5)
0033          5 FORMAT(1H1)
0034          WRITE(LOUT,1)
0035          1 FORMAT(23H LUMINANCE DISTRIBUTION,/,1X,22(1H-),///)
0036          WRITE (LOUT,6) ROBS,SOBS
0037          6 FORMAT(23H CRSEFFVEE POSITION: P =,F7.2,5H S =,F7.2///)
0038          WRITE (LOUT,2) (W(J),J=1,K)
0039          2 FORMAT(3X,5HP / S,1X,10F6.1)

```

```
0040 WRITE (LOUT,2)
0041 3 FORMAT(/IX,71('H'))
0042 DO 100 J=1,NRC
0043 WJ = RCMIN + DECFLOAT(J-1)
0044 100 WRITE (LOUT,4) WJ,(ALUM(J,I),I=J1,J2)
0045 4 FORMAT(/IX,F6.2,2H x,10F6.2)
0046 WRITE (LOUT,3)
0047 50 CONTINUE
0048 RETURN
0049 END
```



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1	1.00	4.00	3.41	3.00	1.00
2	14.00	26.00	15.10	3.00	1.00
3	12.00	15.00	47.00	3.75	1.00
5	0.00	0.20	0.00	0.00	1.00
6	0.00	0.00	0.00	0.00	1.00

1.00

655	619	533	431	341	269	224	139	102	121	94	81	71	63	57	51	47
43	41	37	35	33	31	30	29	28	27	26	25					
555	619	533	431	341	269	224	139	102	121	94	80	69	59	52	47	42
34	34	31	28	25	23	21	20	18	16	15	14					
655	619	533	431	341	269	224	139	102	117	86	66	55	43	36	31	25
22	18	15	14	12	11	9	8	7	6	6	5					
655	619	533	431	341	269	224	171	135	95	60	46	32	24	19	15	12
10	8	6	5	4	4	3	3	2	2	2	2					
555	619	533	431	323	251	193	152	117	79	49	33	23	17	14	11	8
5	5	4	4	3	3	2	2	2	1	1	1					
555	619	533	431	323	242	131	119	108	66	41	28	20	14	12	9	7
5	4	4	3	3	2	2	2	1	1	0	0					
655	619	521	431	205	274	172	130	99	60	38	25	18	13	10	8	6
5	4	3	3	2	2	1	1	1	1	0	0					
555	619	521	431	296	207	162	121	94	57	36	23	16	12	9	7	6
5	4	1	1	1	1	1	1	1	1	1	0					
655	619	521	431	287	190	153	117	90	54	34	22	15	12	9	7	6
0	0	0	0	0	0	0	0	0	0	0	0					
655	619	521	431	257	189	143	112	85	52	33	22	14	11	8	7	0
0	0	0	0	0	0	0	0	0	0	0	0					
655	619	521	395	278	189	144	108	85	51	32	21	14	11	8	0	0
0	0	0	0	0	0	0	0	0	0	0	0					
655	619	503	386	269	190	144	103	83	50	31	21	14	11	8	0	0
0	0	0	0	0	0	0	0	0	0	0	0					
655	619	503	371	269	187	137	99	84	51	31	22	15	12	9	0	0
0	0	0	0	0	0	0	0	0	0	0	0					
655	601	503	371	269	180	139	99	84	52	32	22	17	13	10	0	0
0	0	0	0	0	0	0	0	0	0	0	0					
655	601	503	371	269	180	137	103	86	54	35	24	19	14	11	0	0
0	0	0	0	0	0	0	0	0	0	0	0					
655	601	503	371	269	180	144	108	90	55	36	27	20	14	12	0	0
0	0	0	0	0	0	0	0	0	0	0	0					
655	601	503	371	269	189	143	112	94	61	40	29	22	16	14	0	0
0	0	0	0	0	0	0	0	0	0	0	0					
655	601	503	386	278	198	133	121	99	65	43	31	23	17	15	0	0
0	0	0	0	0	0	0	0	0	0	0	0					
655	601	503	395	278	207	132	130	103	69	47	34	25	19	16	0	0
0	0	0	0	0	0	0	0	0	0	0	0					
655	601	503	395	278	224	131	139	101	75	51	38	27	21	16	0	0
0	0	0	0	0	0	0	0	0	0	0	0					

CIE (TC4.8) STANDARD PROGRAM

\*\*\*\*\*

ROAD DESCRIPTION

NO. OF CARRIAGEWAYS 2  
 NO. OF LANES PR. CARRIAGEWAY 4  
 WIDTH OF LANE 3.40 M  
 WIDTH OF CENTRAL RESERVE 5.00 M

REFLECTION PROPERTIES GIVEN BY I-TABLE NO 1.000

LIGHTING INSTALLATION

THE INSTALLATION COMPRISES 2 ROW(S) OF LUMINAIRES

LIGHT DISTRIBUTION NO 112  
 TILTING ANGLE 15.00 DEGREES  
 LUMINOUS FLUX OF LAMP 47.000 KILO-LUMENS  
 MAINTENANCE FACTOR 0.75  
 HEIGHT OF SUSPENSION 14.00 M  
 LUMINAIRE SPACING 36.00 M  
 POSITION OF ROWS  
 RELATIVE TO LEFTHAND EDGE OF CARRIAGEWAY

ROW NO	POSITION (METERS)	3-D PLANE POINTS
1	15.30	AWAY FROM OBSERVER
2	18.10	TOWARDS OBSERVER

GLARE CALCULATION

FLASHED AREA OF LUMINAIRE 0.200 SQ-M  
 COLOUR FACTOR 0.0

HORIZONTAL ILLUMINANCE DISTRIBUTION

H / S 00.0 63.6 67.2 70.8 74.4 78.0 81.6 85.2 88.8 92.4

\*\*\*\*\*

0.3+ \* 13.50 18.91 20.70 19.27 17.71 16.78 17.74 19.74 20.84 19.06

1.02 \* 15.56 20.07 21.54 21.71 18.47 17.70 18.51 20.78 21.66 20.22

1.71 \* 20.07 21.32 22.44 21.93 19.48 19.12 19.51 22.00 22.55 21.47

2.38 \* 23.60 23.15 23.80 23.31 20.93 20.79 20.96 23.38 23.92 23.20

3.06 \* 25.21 25.52 25.50 24.94 22.81 22.59 22.84 25.01 25.69 25.66

3.74 \* 26.72 27.33 27.28 27.17 25.03 24.71 25.07 27.24 27.40 27.47

4.42 \* 28.38 29.21 29.40 28.97 27.21 26.68 27.23 29.04 29.58 29.34

5.10 \* 30.34 31.09 31.39 31.65 29.16 28.68 29.19 30.73 32.00 31.22

5.78 \* 32.15 33.15 34.01 32.29 30.97 30.60 31.30 32.37 34.13 33.29

6.46 \* 33.80 35.24 35.78 33.66 32.49 32.00 32.53 33.74 35.89 35.28

7.14 \* 35.22 37.19 37.12 34.74 33.72 32.65 33.70 34.82 37.21 37.33

7.82 \* 36.30 39.63 38.90 35.46 34.60 33.33 34.64 35.54 38.10 39.77

8.50 \* 36.89 40.96 38.07 35.56 34.81 33.82 34.85 35.63 38.76 41.10

9.18 \* 36.87 40.75 38.94 35.35 34.59 34.06 34.63 35.43 39.03 40.90

9.86 \* 36.13 39.80 38.75 34.62 33.89 33.74 33.93 34.69 38.84 39.95

10.54 \* 34.76 37.40 37.70 33.43 32.55 32.60 32.59 33.50 37.82 37.54

11.22 \* 33.17 35.53 36.31 31.05 31.17 31.37 31.21 30.72 36.40 33.67

11.90 \* 31.28 30.93 29.50 28.32 29.52 29.76 29.55 28.37 33.59 31.07

12.58 \* 29.09 28.39 28.50 26.31 27.65 28.09 27.68 26.35 30.62 28.53

13.26 \* 26.14 25.89 27.19 24.86 25.71 26.34 25.74 24.91 27.28 26.02

\*\*\*\*\*

## QUALITY CHARACTERISTICS OF ILLUMINANCE

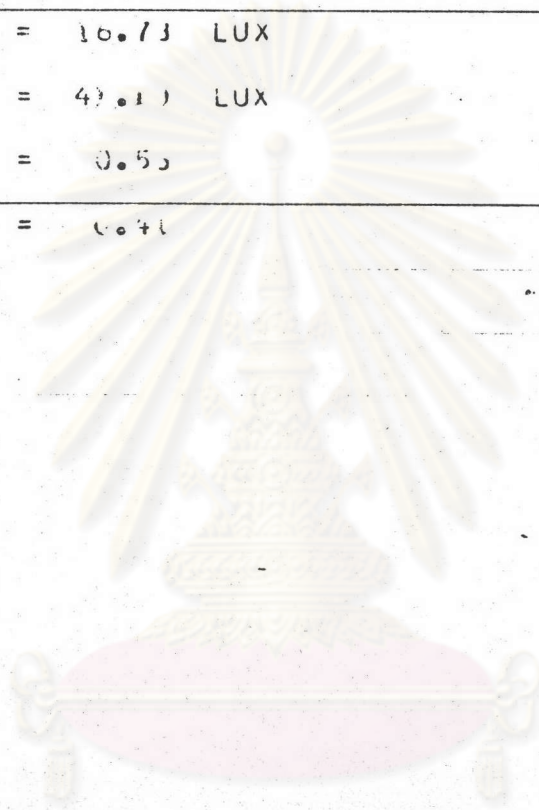
$$E_{\text{MEAN}} = 29.73 \text{ LUX}$$

$$E_{\text{MIN}} = 16.73 \text{ LUX}$$

$$E_{\text{MAX}} = 49.11 \text{ LUX}$$

$$E_{\text{MIN}} / E_{\text{MEAN}} = 0.56$$

$$E_{\text{MIN}} / E_{\text{MAX}} = 0.34$$



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LUMINANCE DISTRIBUTION

OBSERVER POSITION: P = 5.41 S = 0.0

n / s 60.0 63.6 67.2 70.8 74.4 78.0 81.6 85.2 88.8 92.4

\*\*\*\*\*

0.34 \* 1.99 2.02 2.05 2.08 1.86 1.80 1.38 2.07 2.22 2.07

1.01 \* 2.09 2.12 2.15 2.18 1.92 1.87 1.94 2.18 2.31 2.17

1.70 \* 2.31 2.34 2.37 2.40 2.04 2.00 2.02 2.31 2.40 2.29

2.33 \* 2.46 2.49 2.52 2.55 2.24 2.16 2.15 2.44 2.53 2.46

3.00 \* 2.61 2.64 2.67 2.70 2.33 2.33 2.33 2.60 2.70 2.67

3.74 \* 2.75 2.82 2.85 2.88 2.56 2.52 2.55 2.82 2.86 2.83

4.42 \* 2.91 3.01 3.02 2.99 2.78 2.71 2.77 3.02 3.07 3.00

5.10 \* 3.08 3.19 3.25 3.18 2.99 2.92 2.97 3.19 3.25 3.16

5.78 \* 3.26 3.39 3.45 3.39 3.22 3.15 3.19 3.36 3.50 3.33

6.45 \* 3.41 3.60 3.67 3.58 3.43 3.33 3.39 3.53 3.75 3.49

7.14 \* 3.52 3.79 3.85 3.76 3.60 3.44 3.57 3.65 3.87 3.64

7.82 \* 3.58 3.99 3.95 3.90 3.74 3.54 3.60 3.74 3.89 3.81

8.50 \* 3.56 4.06 4.05 3.95 3.79 3.61 3.67 3.76 3.89 3.88

9.18 \* 3.48 3.97 4.05 3.96 3.78 3.64 3.66 3.71 3.86 3.83

9.85 \* 3.35 3.82 3.93 3.80 3.70 3.63 3.60 3.61 3.81 3.67

10.54 \* 3.19 3.55 3.65 3.72 3.54 3.47 3.45 3.48 3.68 3.43

11.22 \* 3.00 3.20 3.67 3.45 3.40 3.32 3.28 3.19 3.50 3.10

11.90 \* 2.78 2.90 3.37 3.19 3.22 3.14 3.10 2.93 3.22 2.86

12.58 \* 2.55 2.63 3.01 2.91 3.01 2.96 2.90 2.70 2.93 2.63

13.25 \* 2.28 2.36 2.65 2.66 2.77 2.75 2.70 2.54 2.61 2.39

\*\*\*\*\*

## QUALITY CHARACTERISTICS OF LUMINANCE

OBSERVER POSITION: R = 0.45 S = 0.0

AVERAGE LUMINANCE	3.05 CD/SQ M
OVERALL UNIFORMITY	0.59
VEILING LUMINANCE	0.46 CD/SQ M
THRESHOLD INCREMENT	9.69 PERCENT
DISCOMFORT GLARE CONTROL VALUE	5.03

OBSERVER POSITION: R = 0.70 S = 0.0

LONGITUDINAL UNIFORMITY	0.83
-------------------------	------

OBSERVER POSITION: R = 0.0 S = 0.0

LONGITUDINAL UNIFORMITY	0.89
-------------------------	------

OBSERVER POSITION: R = 0.51 S = 0.0

LONGITUDINAL UNIFORMITY	0.89
-------------------------	------

OBSERVER POSITION: R = 0.9 S = 0.0

LONGITUDINAL UNIFORMITY	0.84
-------------------------	------

ภาคผนวกที่ 10 ตารางการกระจายความเข้มแสงการส่องสว่างของโคมไฟถนนรัศมี 1 เมตร

α°	270	285	300	310	315	320	325	330	335	340	345	350	355	360	5	10	15	20	25	30	35	40	45	50	60	75	90
0	172	172	172	172	172	172	172	172	172	172	172	172	172	172	172	172	172	172	172	172	172	172	172	172	172	172	172
10	136	135	142	151	155	160	164	169	175	182	188	194	200	201	207	215	209	209	208	203	204	203	201	196	186	175	176
20	94	95	103	115	121	129	137	145	157	170	182	192	202	208	212	213	212	210	205	200	192	185	177	171	158	138	137
30	69	72	88	103	110	120	129	139	162	184	207	221	236	244	248	247	244	235	223	203	177	157	137	127	107	79	75
35	56	60	78	95	103	115	123	140	160	181	201	220	239	251	256	254	247	233	219	196	165	143	121	113	97	71	67
40	57	60	75	94	104	115	127	138	143	159	169	195	221	241	253	252	238	216	189	162	141	124	107	100	86	59	54
45	75	71	80	99	109	117	125	135	150	168	185	230	276	320	336	327	295	239	176	143	120	117	106	95	73	45	39
47.5	90	81	83	99	107	114	122	129	153	182	201	251	302	346	359	352	310	241	175	141	122	111	100	89	67	44	40
50	105	91	87	100	100	110	119	125	156	187	210	273	329	373	383	377	325	244	176	140	117	106	95	84	61	43	42
52.5	116	97	89	96	100	110	122	132	169	205	241	302	363	412	431	416	352	267	196	152	121	106	91	80	57	49	57
55	128	103	92	93	94	109	125	140	182	223	265	331	397	451	480	455	380	291	217	165	125	106	87	76	53	55	73
57.5	126	101	88	92	94	124	154	184	220	255	290	369	448	504	545	520	434	330	246	169	124	108	81	73	56	61	81
60	125	100	85	91	94	139	184	229	258	287	316	407	499	558	611	585	488	369	275	214	144	110	76	70	59	68	90
62.5	114	91	76	84	88	101	134	157	194	231	268	370	473	546	586	567	451	323	241	168	131	100	69	65	57	69	91
65	104	82	68	77	82	83	84	85	130	176	221	334	448	535	561	550	414	278	207	163	118	90	62	60	55	71	93
67.5	89	68	56	70	70	70	71	71	113	156	198	276	356	416	447	453	352	243	174	135	99	79	59	56	50	68	86
70	74	54	44	63	58	58	58	58	97	136	175	219	264	298	333	356	290	209	141	107	81	69	56	53	46	66	79
72.5	52	38	32	43	41	42	43	45	68	100	127	151	174	195	215	228	403	148	97	76	60	52	44	42	37	52	62
75	29	23	21	23	24	27	29	32	40	64	80	83	85	93	98	101	117	88	54	45	39	36	32	31	28	39	45
77.5	18	16	15	17	18	20	23	25	30	53	59	66	72	80	84	83	90	76	45	37	32	28	24	23	20	26	30
80	10	10	10	11	12	14	17	19	20	32	38	49	60	67	68	65	63	64	36	30	25	21	16	15	12	13	15
82.5	8	8	8	9	10	12	14	15	18	25	30	38	46	51	54	50	47	46	29	24	20	17	13	12	10	10	11
85	7	7	7	8	9	10	11	12	16	19	22	27	32	35	36	35	32	28	22	18	15	13	10	9	8	8	8
87.5	6	6	6	7	8	9	10	11	14	16	18	22	26	28	29	28	26	22	19	16	14	12	9	8	7	7	7
90	6	6	6	7	8	9	9	10	12	13	15	18	20	22	23	21	20	17	16	14	13	11	9	8	7	7	7
92.5	5	5	5	6	7	8	8	9	10	11	12	14	16	18	19	17	16	13	13	12	11	10	8	7	6	6	6
95	5	5	5	6	7	7	8	8	9	9	10	11	13	15	15	14	12	10	10	10	19	9	8	7	6	6	5
97.5	4	4	4	5	6	6	7	7	7	8	9	10	12	13	13	12	11	9	9	9	9	8	7	6	5	4	4
100	3	3	4	5	5	6	6	7	7	8	8	9	11	12	12	11	10	9	9	9	8	7	6	5	4	4	4
102.5	2	2	3	4	4	5	5	6	7	7	8	9	10	11	11	10	9	8	8	8	7	6	5	4	3	3	3
105	1	1	3	4	4	5	5	6	7	7	8	9	10	10	10	10	8	7	7	6	6	5	4	3	3	3	3
120			1	2	3	4	5	6	7	8	8	9	12	14	15	15	11	8	6	5	4	3	3	3	2	1	
135						1	1	1	1	2	2	2	3	4	4	4	4	3	2	1	1	1	1	1	1		
150																											
165																											
180																											

ภาคผนวกที่ 11 ตารางการกระจายความเข้มแห่งการส่องสว่างของโคมไฟถนนทางควนดินแดง-บางนา

α° C°	270	285	300	310	315	320	325	330	335	340	345	350	355	360	5	10	15	20	25	30	35	40	45	50	60	75	90	
0	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	
10	146	146	147	147	148	150	155	156	158	160	162	163	165	168	168	168	175	178	178	180	180	180	180	180	180	180	180	180
20	140	140	142	142	144	148	150	155	158	168	171	175	178	180	180	180	187	188	188	188	188	188	180	180	180	175	173	172
30	128	138	138	144	149	155	162	168	175	180	184	187	188	188	188	188	190	190	190	190	190	190	180	175	170	163	156	152
35	125	125	138	150	152	162	170	175	181	193	200	208	210	210	210	210	210	209	200	194	187	180	175	165	156	135	135	
40	120	120	138	152	162	168	175	181	187	202	208	218	220	224	224	224	226	220	216	206	190	185	175	160	145	130	130	
45	115	115	136	155	165	170	178	185	200	206	214	227	237	240	241	242	250	240	228	216	200	186	174	156	138	128	125	
47.5	113	114	130	150	150	165	175	180	190	203	215	230	242	246	248	250	255	246	237	218	200	184	170	156	132	123	120	
50	110	113	128	140	150	160	168	175	187	201	214	228	242	252	255	258	264	250	236	217	198	178	163	154	130	120	115	
52.5	108	112	124	130	140	150	156	163	180	198	206	220	245	260	264	268	274	255	235	215	197	174	160	150	128	115	110	
55	105	110	115	125	128	140	150	156	174	184	202	218	237	264	275	276	280	255	234	210	180	164	150	136	125	110	105	
57.5	103	105	112	115	125	128	140	150	162	175	200	215	230	268	280	284	282	253	222	200	175	160	140	125	115	105	100	
60	101	100	100	106	113	115	125	138	150	160	175	202	220	270	282	294	290	250	220	190	170	135	125	113	110	100	80	
62.5	100	95	90	100	100	105	117	125	128	140	150	187	218	272	280	312	300	246	213	187	140	125	120	106	100	80	75	
65	86	85	85	86	85	90	100	108	113	125	138	174	210	250	270	290	280	240	210	175	130	115	100	90	85	72	70	
67.5	78	70	70	71	70	80	85	88	90	95	125	150	200	236	250	268	270	236	200	160	120	95	85	80	72	62	60	
70	72	68	60	60	60	65	70	75	77	85	100	125	175	220	236	250	237	215	175	125	100	75	70	65	62	55	52	
72.5	70	60	50	50	50	55	56	60	62	65	70	100	150	190	218	224	218	190	150	100	70	65	52	50	50	45	45	
75	52	50	40	40	40	40	42	45	45	45	50	80	105	150	180	190	175	150	110	70	50	40	38	35	40	35	35	
77.5	35	30	25	25	25	30	32	33	33	33	36	50	70	95	125	140	125	100	70	50	35	30	25	24	30	25	25	
80	25	20	15	15	15	18	20	22	22	22	25	32	48	70	70	70	70	60	44	30	20	18	15	15	16	15	15	
82.5	15	10	10	10	10	12	13	15	15	15	18	22	30	40	50	60	60	50	30	20	15	10	10	10	10	8	8	
85	6	5	5	5	6	7	7	8	8	8	10	15	20	20	23	25	25	20	18	15	10	7	6	6	6	5	5	
87.5	4	3	3	3	4	4	4	5	5	5	6	7	10	15	15	16	16	12	10	10	7	5	4	4	4	3	3	
90	2	1	1	1	2	2	2	3	3	3	4	4	5	6	6	7	7	6	6	5	4	3	2	2	2	1	1	
92.5																												
95																												
97.5																												
100																												
102.5																												
105																												
120																												
135																												
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ภาคผนวกที่ 12 ตารางการกระจายความเข้มแห่งการส่องสว่างของโคมไฟถนนชนิดรี อ.เมือง จ.นครราชสีมา

$\gamma^\circ$	270	285	300	310	315	320	325	330	335	340	345	350	355	360	5	10	15	20	25	30	35	40	45	50	60	75	90		
0	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103		
10	104	105	106	107	107	108	108	110	110	110	110	110	110	110	110	110	110	110	110	110	110	108	108	106	104	104	104		
20	103	103	106	107	107	108	109	110	111	111	111	111	111	111	111	111	111	111	111	110	110	108	108	107	104	103	102		
30	101	102	104	107	108	112	112	113	113	114	115	115	115	115	115	115	115	114	114	114	112	107	107	105	103	101	101		
35	100	101	103	106	107	111	112	114	116	117	120	120	121	121	121	120	119	118	114	114	110	107	106	104	102	100	95		
40	88	100	103	105	107	110	113	114	116	122	125	126	128	128	128	126	125	119	115	113	108	106	105	103	101	95	81		
45	75	90	102	104	107	108	112	114	120	128	130	135	135	135	135	133	130	119	114	114	108	106	106	103	101	80	73		
47.5	70	88	101	103	106	107	111	114	124	129	134	136	136	136	136	134	132	120	113	114	110	106	106	104	101	78	65		
50	60	82	101	103	106	107	111	115	124	130	135	138	140	140	140	138	133	122	115	113	110	107	106	104	101	76	58		
52.5	55	75	101	103	106	108	111	115	125	130	137	140	142	142	142	140	135	127	116	113	111	108	107	104	101	75	54		
55	50	70	101	103	106	110	112	115	126	132	138	144	146	146	146	144	140	125	120	114	112	109	108	103	101	70	50		
57.5	44	63	101	104	106	109	113	115	127	133	140	146	148	148	148	146	142	127	123	115	113	109	107	103	100	65	44		
60	38	60	101	104	106	100	114	116	127	134	144	150	156	156	156	150	143	130	123	115	113	108	106	102	98	63	38		
62.5	31	55	100	103	106	107	112	115	127	132	144	168	170	170	170	168	145	130	124	115	112	107	105	101	96	60	32		
65	26	50	100	103	106	106	111	115	124	131	142	172	175	190	175	172	150	129	123	115	110	106	104	101	90	50	28		
67.5	25	48	88	102	105	106	110	113	120	130	137	174	180	195	180	174	152	128	120	114	108	105	103	100	85	45	25		
70	20	45	85	101	102	105	107	110	115	120	130	150	160	160	160	150	130	120	115	110	105	102	101	98	75	41	19		
72.5	16	40	80	100	102	102	105	105	110	115	116	125	130	130	130	125	120	115	110	105	102	100	90	88	70	39	14		
75	13	39	75	90	100	100	100	101	102	102	105	104	105	105	105	104	104	103	100	93	80	80	78	76	75	56	30	10	
77.5	10	38	70	80	88	90	90	95	100	100	100	100	100	100	100	100	95	94	90	82	70	78	76	74	70	50	28	8	
80	8	31	63	75	78	80	80	80	80	85	88	88	88	88	88	88	88	88	83	80	80	77	76	74	70	50	28	8	
82.5	7	27	55	65	70	72	73	73	75	76	76	76	76	76	76	75	75	75	75	75	75	73	73	73	69	46	24	7	
85	6	24	50	55	63	65	65	66	67	68	69	70	70	70	70	68	65	63	62	62	62	62	60	59	52	30	25	6	
87.5	5	13	35	48	60	62	62	63	64	65	65	65	65	65	65	63	62	60	59	59	58	56	53	48	25	20	5	5	
90	4	10	18	30	39	42	43	44	46	48	50	50	50	50	50	48	48	46	44	43	42	41	39	34	20	15	4	4	
92.5																													
95																													
97.5																													
100																													
102.5																													
105																													
120																													
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จุฬาลงกรณ์มหาวิทยาลัย

ภาคผนวกที่ 13 แสดงค่า  $q(\alpha, \beta)$  จากการวัดหิวตัวอย่างคอนกรีตขณะ เบี่ยง

$$r = \frac{q}{\pi} \cdot \cos^3 \gamma \text{ cd/m}^2/\text{Lux}$$

deg $\alpha$ \ $\beta$	$q(\alpha, \beta)$								
	0.0	11.3	21.8	31.0	38.7	45.0	50.2	58.0	63.4
80	68.635	66.270	55.176	23.686	9.981	5.363	4.611	3.636	4.668
70	3.235	10.066	3.105	1.192	0.681	0.515	0.513	0.523	0.645
60	0.469	1.376	0.517	0.292	0.210	0.181	0.190	0.203	0.229
50	0.149	0.371	0.181	0.150	0.128	0.120	0.124	0.131	0.145
40	0.099	0.161	0.125	0.111	0.109	0.109	0.109	0.121	0.133
30	0.085	0.116	0.112	0.113	0.112	0.112	0.112	0.124	0.128
20	0.084	0.109	0.112	0.120	0.117	0.109	0.116	0.123	0.129
10	0.081	0.105	0.111	0.121	0.123	0.117	0.125	0.132	0.140
0	0.081	0.112	0.115	0.120	0.123	0.123	0.126	0.139	0.148
-10	0.082	0.113	0.115	0.126	0.126	0.127	0.135	0.141	0.161
-20	0.083	0.109	0.117	0.125	0.132	0.133	0.142	0.150	0.172
-30	0.084	0.111	0.121	0.129	0.136	0.138	0.148	0.167	0.196
-40	0.086	0.124	0.128	0.139	0.141	0.142	0.162	0.176	0.207
-50	0.094	0.129	0.137	0.154	0.152	0.150	0.169	0.196	0.238
-60	0.102	0.136	0.147	0.153	0.149	0.171	0.188	0.226	0.268
-70	0.112	0.155	0.146	0.172	0.176	0.197	0.220	0.282	0.313
-80	0.128	0.178	0.190	0.200	0.210	0.235	0.268	0.318	0.389



## ประวัติการศึกษา

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มหาวิทยาลัย ปีการศึกษา 2517  
สถานที่ทำงาน แผนกไฟฟ้ากำลัง วิทยาลัยเทคนิคภาคตะวันออกเฉียงเหนือ จังหวัดนครราชสีมา



ศูนย์วิทยุโทรคมนาคม  
จุฬาลงกรณ์มหาวิทยาลัย