

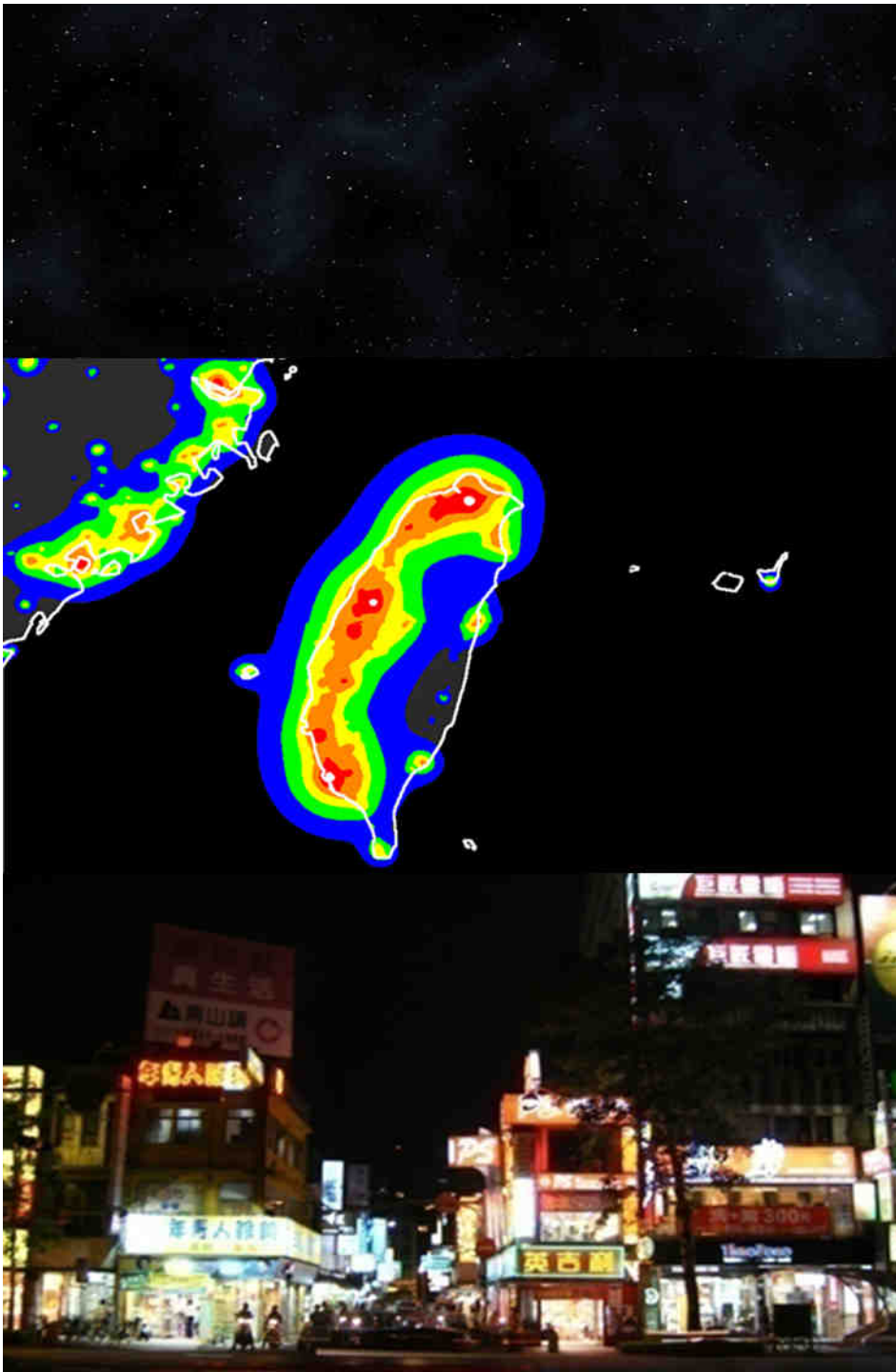
11th European Symposium for the
Protection of the Night Sky



National Cheng-Kung University,
Taiwan(R.O.C)

A study of Light Trespass from
Advertising Signs on building
facade in Taiwan

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Introduction

The advertising signs cause Light Trespass :

- There are no relevant laws for the illumination of the building in Taiwan.
- Lighting designers without review let too much unnecessary light illumine the near indoor space.



- According to A study on light pollution in residential (Chou, 2000), In 1200 questionnaires (600 face the street lamp house and 600 face the advertising signs house).

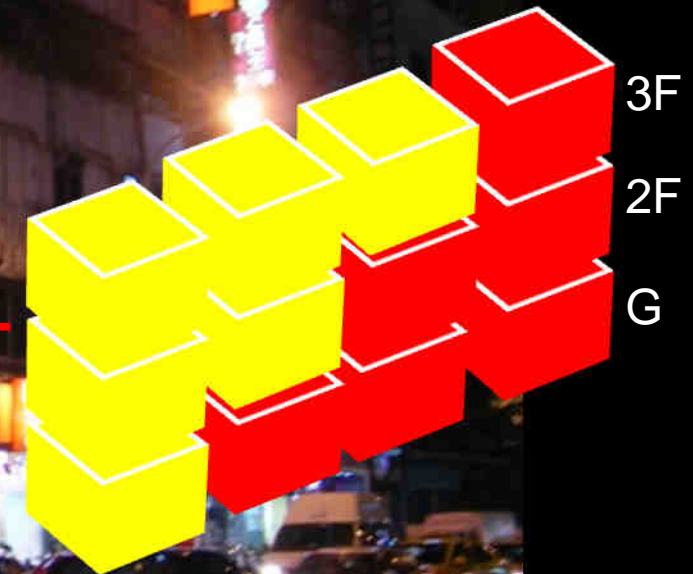
light pollution in residential (1200samples)		600 face the street lamp house and 600 face the advertising signs house	
persons think that is influenced by the light pollution	29%	face the advertising signs	73%
		face the street lamp	27%

Light pollution of the advertising illumination	
flash light	47.6%
influence sleep and cause the TV or computer screen to reflect	27.4%
influence and watch the scenery outside the window	26.6%
reduce the indoor light uniformity	16.3%

The Mixed Residential Commercial District

Mess in the residential and commercial environment

residential use
commercial use



Light Trespass

IESNA Defines Two Types of Light Trespass:

1. Adjacent property receives unwanted light.
2. Excessive brightness occurs in the normal field of view (nuisance glare).



Source: RAB Electric MFG., Inc. ; Departament d'Astronomia i Meteorologia



Source: David Fernández-Barba, Dep. d'Astronomia i Meteorologia, Universitat de Barcelona, SPAIN

The CIE Guide of Light Trespass

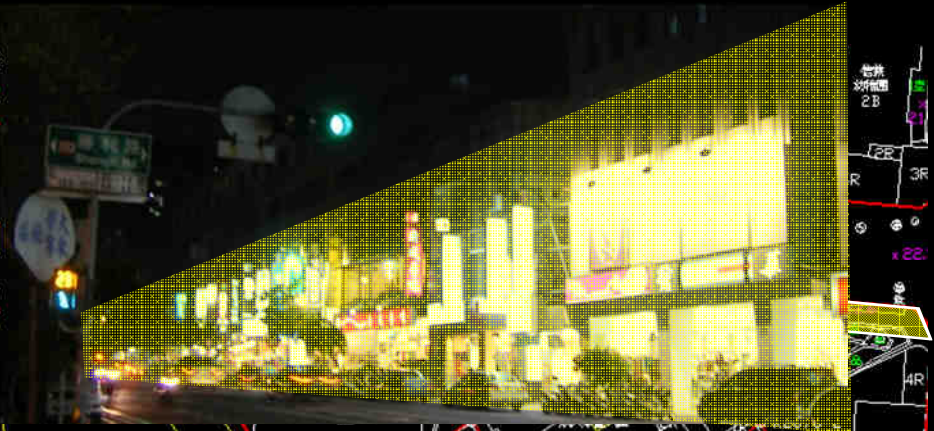
Light into Windows E_v [lux]	Zone			
	E1	E2	E3	E4
before curfew	2	5	10	25
after curfew, (23:00~06:00)	0	1	2	5
Zone Rating : E1-Nature, intrinsically, National Parks, protected sides E2-Rural, low district brightness, Industrial or residential rural areas E3-Suburban, medium district brightness, Industrial or residential suburbs E4-Urban, high district brightness, town centres, commercial areas				

CIE,(2003).Guide on the limination of the effects of obtrusive light from outdoor lighting instalation. *Technical Report. Publication No.150*. Commission Internationale de l'Eclairage (CIE) ,Vienna,

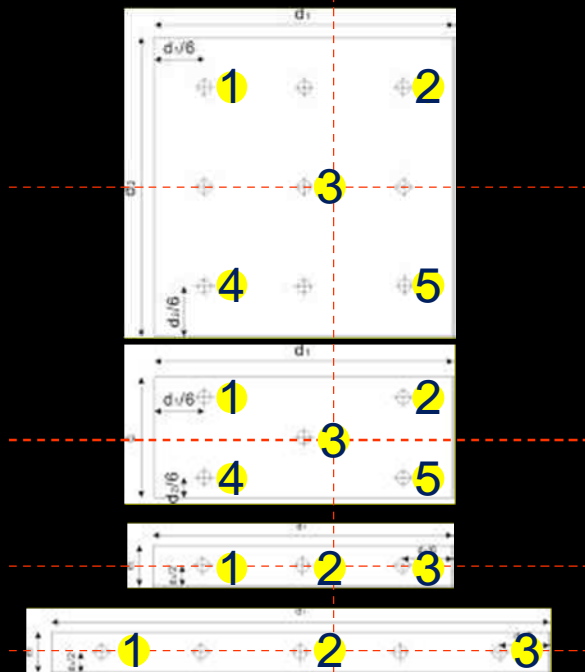


Measure basis

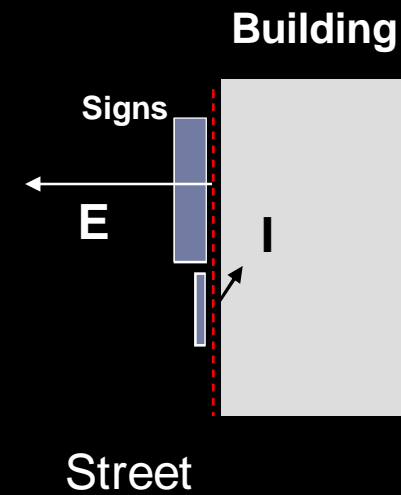
- The measurement of light trespass in international is to regard vertical intensity of illumination at the particular border as the basis of assessing:
 - realm line of building
 - analytic point on the window surface



- Measuring :



Advertising signs
measure spot



Meters

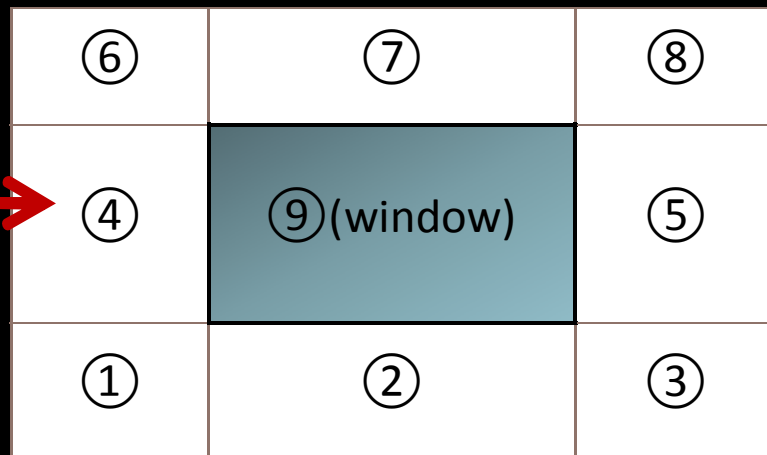


Illuminance Minolta T-10



Luminance Minolta LS-100

Measure Steps



Set the measure spot along the windows



Measure time is between the stores opening in period 7~10 o'clock at night.

Avoid the cloudy and raining day.

Separate the building facade into 9 blocks.

Measure illuminance on the 2F and 3F facade.

Measure luminance of advertising signs close to the facade.

Calculate the average illumination of blocks on the building.

Sample selection

Select 4 of the most famous cities in Taiwan

Total 8 streets



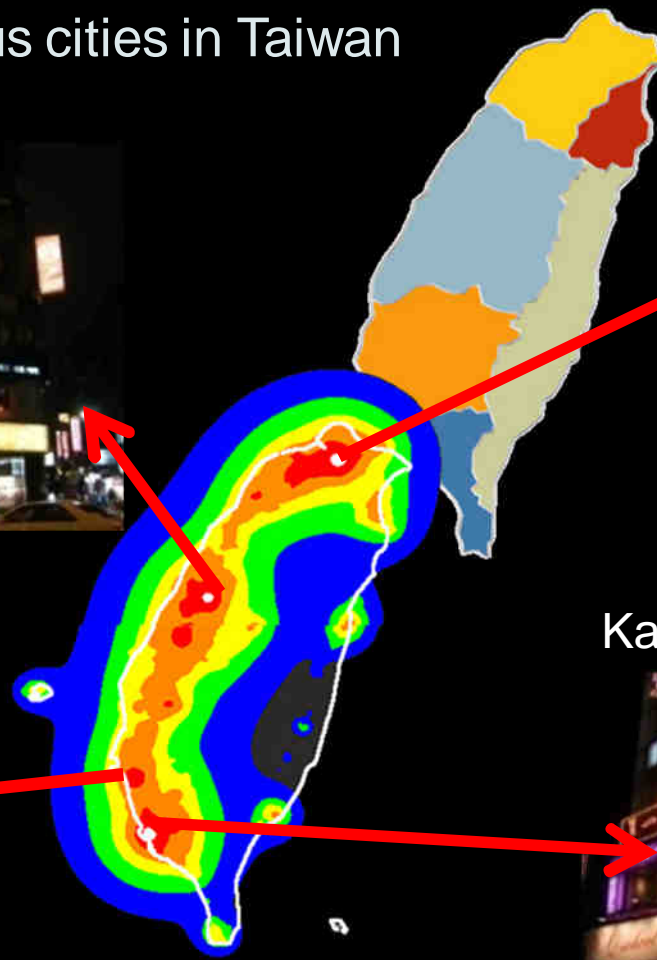
Taichung



Taipei



Tainan



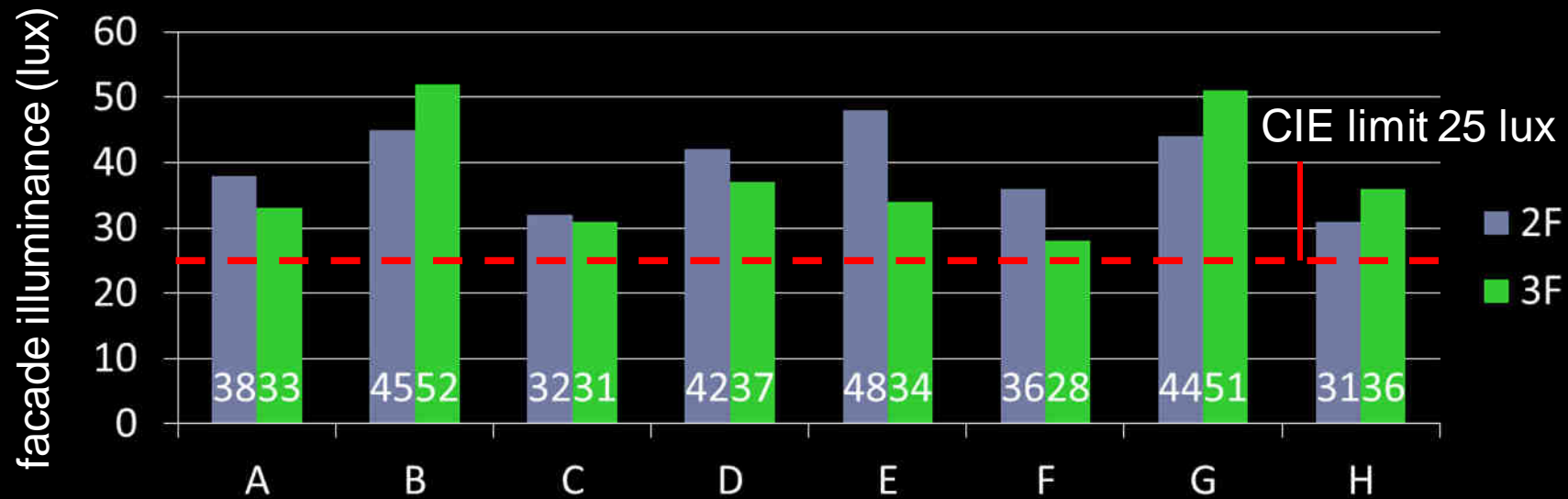
Kaohsiung



Entire situation result

The streets average facade illumination above 10~20 lux in CIE limit value standard 25 lux.

There is the maximum average facade illumination up to 52 lux on 3rd floor of street B.



Relation of commercial floors and facade illumination

Facade illumination that the 3rd floor over the 2nd floor, there is a higher rate of two or three commercial floors in building.

The streets have many commercial activities also raising the facade illumination. Cause the facade illumination increasing to higher residential floors.



Business in
one floor



Business in
two floors

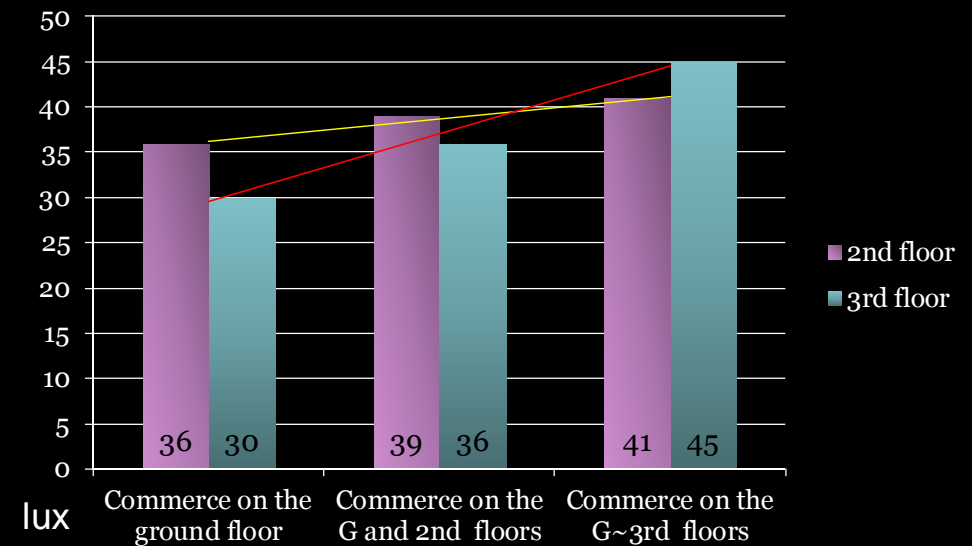
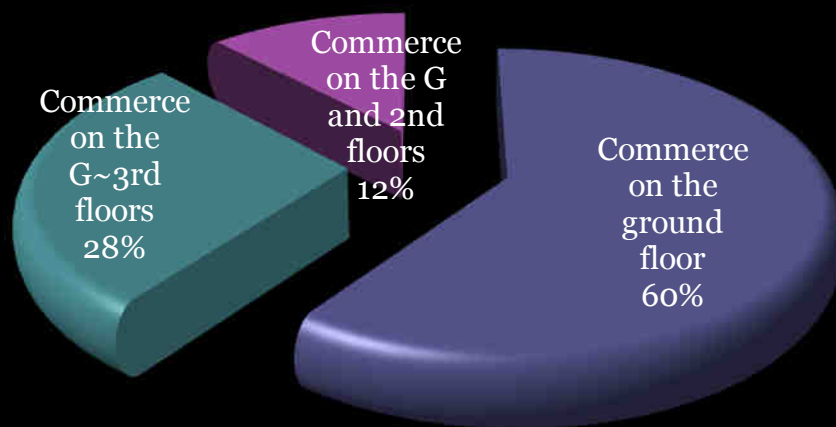


Business in
three floors





Streets	One floor	Two floors	Three or over three floors
Taipei	64%	26%	10%
Taichung	47%	26%	27%
Tainan	90%	10%	0%
Kaohsiung	69%	25%	6%

The facade illuminance would be raising by how many floors for commercial using.

Commerce on the high level causes the illuminance over lower level.



Advertising signs styles

				
Lighting box	Externally illuminated	Text lighting box	Background lighting box	Steady neon
				
Neon	LED	LED Channel Letter (bg)	LED Channel Letter(no bg)	LED displayer






Advertising signs luminance

Types			L _{Avg} (cd/m ²)									Signs over 1000 cd/m ²		
			Taipei	N	Taichung	N	Tainan	N	Kaohsiung	N	Total		N	
Externally illuminated			515	6	338	10	241	6	264	6	339	28	1	
Internally illuminated	Lighting box		258	14	343	9	226	12	452	3	283	38	1	
	Text lighting box		152	10	340	6	242	8	205	4	226	28	2	
	Background lighting box		8	5	43	3	16	4	18	3	19	15	0	
Expose illuminated	Steady neon		295	8	302	6	288	7	281	3	293	24	0	
	Flash neon		161	5	257	2	192	4	167	2	186	13	0	
	LED lighting box		498	12	927	12	671	12	602	6	684	42	6	
	LED Channel Letter (bg)		744	9	898	7	791	8	796	9	802	33	7	
	LED Channel Letter(no bg)		696	4	1660	3	984	5	1271	4	1111	16	4	
	LED displayer		946	3	920	5	912	2	792	2	904	12	5	
				Total									249	26

Analyze the advertising signs set ways

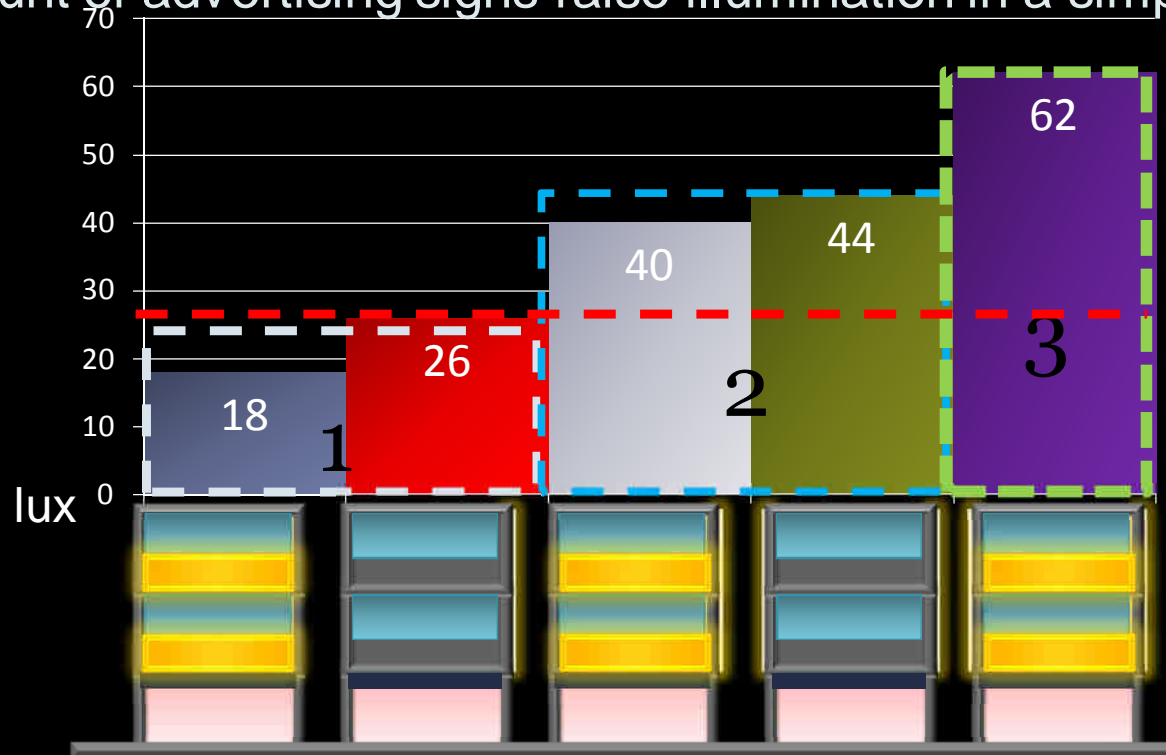
In order to understand different advertising signs position make the different light trespass effect. Research divided advertising signs into five position styles :

1. Only set the horizontal sign,
2. Only set the vertical sign for single side,
3. Set the horizontal sign and vertical sign for single side,
4. Set the vertical signs for both sides,
5. Set the horizontal sign and vertical signs for both sides.

styles	1.	2.	3.	4.	5.	
figure						Third floor Second floor First floor

Analyse the advertising signs set ways

- Only set horizontal signs or single side vertical signs (1. 2.) The illumination increase about 22 lux to the building facade.
- Once facade set two or more advertising signs (3. 4. 5.) will go beyond CIE standard value.
- Amount of advertising signs raise illumination in a simple rate.



Opportunity

9:00 PM ———→ 12:00 AM





Conclusion

Here are the present situation of light trespass conclusions:

1. Sample streets are mostly goes beyond the value 25 lux that CIE limit.
2. Over five kinds of advertising signs exceed CIE150 specification limit (5 lx)
3. While only three types of signs meet the specifications below CIE150 residential cap (2 lx)
4. The single sign makes the building plus about 22 lux of the facade illumination.



Thanks for your attention!

Acknowledgements

The authors would like to thank the National Science Council and Bureau of Energy, Ministry of Economic Affairs of Taiwan, R.O.C. for the financial support under Contract No. 100-2221-E-006-040-MY2 and 100-D0204-6 and the LED Lighting Research Center of NCKU for the assistance of device characterization.