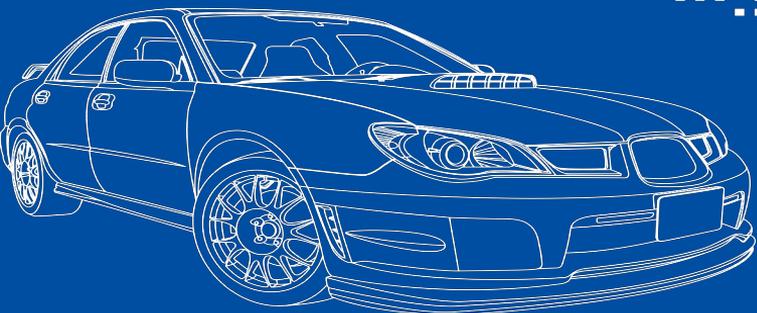




路面特性对投影灯光学效果的影响

Influence of Road reflectivity Properties on Projection Pattern's Visual Effect

星宇车灯 照亮世界
Xingyu Lighting Brighten the World





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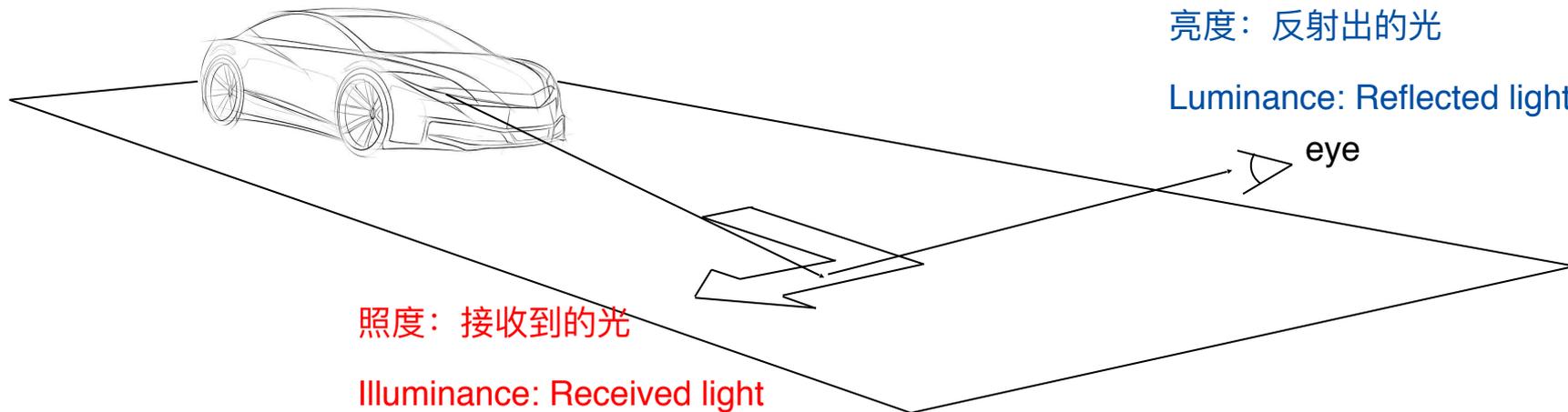
➤ 投影灯应用场景

Applications of projection lamp



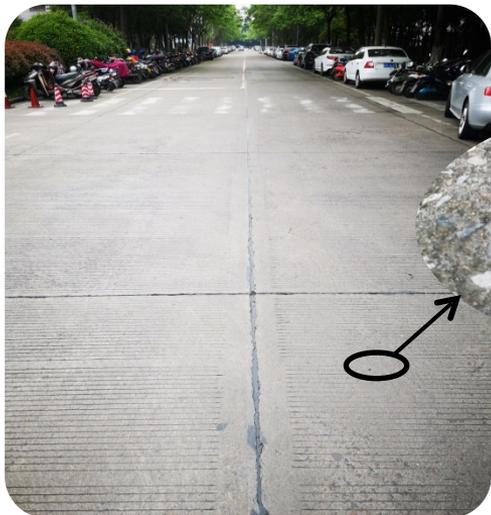


- 人眼看到的是亮度，而不是照度
It's luminance not illuminance that can be received into human's eyes.
- 亮度与路面反射特性有关
the luminance is related to the road reflectivity characteristics.





- 路面种类：水泥路面、沥青路面 Road classification: cement and asphalt road
- 城市道路、高速公路、主干道以沥青路为主，乡村公路以水泥路居多
City road, highway and main road are mainly asphalt while the country road is cement
- 沥青路优点：反射率低（30%→5%）、噪声小、韧性好、更防滑、易维护
Advantages of asphalt road: low reflectivity, low noise, non-slip, easy maintenance



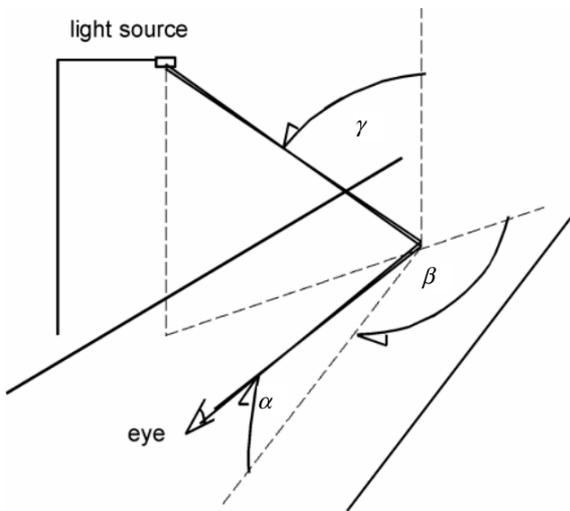


➤ 路面按S1(表征光泽度)分类：干路面R、湿路面W

Classified according to S1 (as gloss): dry road R series, wet road W series

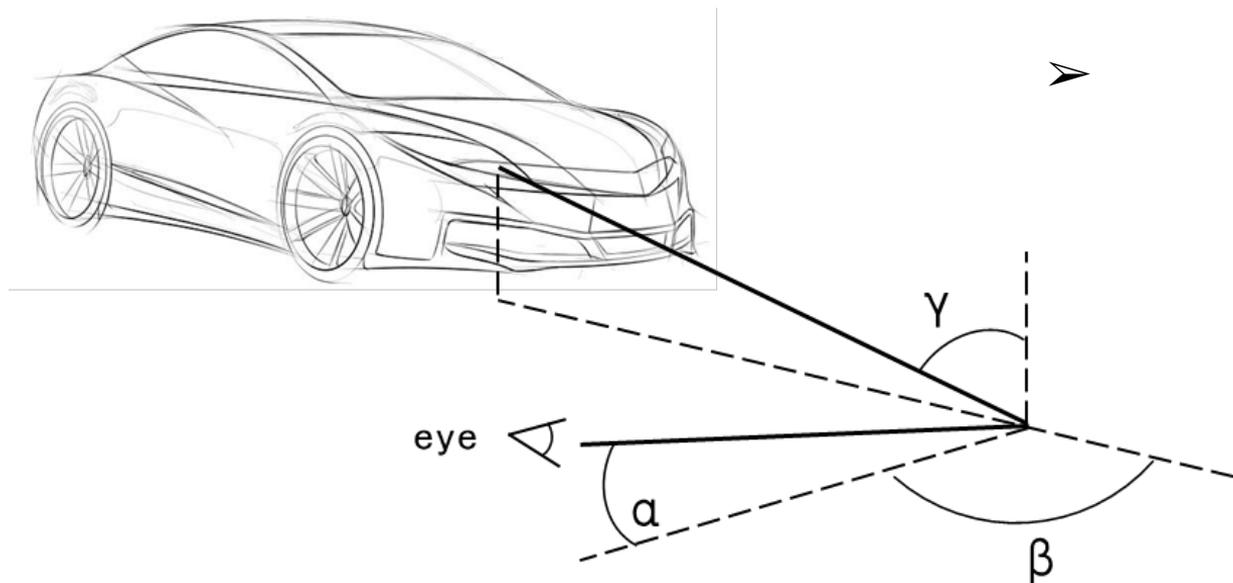
Class		Table	
Name	S1 range	Name	S1
RI	$S1 < 0.42$	R1	0.25
RII	$0.42 \leq S1 < 0.85$	R2	0.58
RIII	$0.85 \leq S1 < 1.35$	R3	1.11
RIV	$1.35 \leq S1$	R4	1.55

Class		Table	
Name	S1 range	Name	S1
WI	$S1 < 4.5$	W1	3.2
WII	$4.5 \leq S1 < 7.2$	W2	5.7
WIII	$7.2 \leq S1 < 9.8$	W3	8.7
WIV	$19.8 \leq S1 < 12$	W4	10.9



- 入射角 incident angle γ
- 观察角度 View angle: $\alpha=1^\circ$

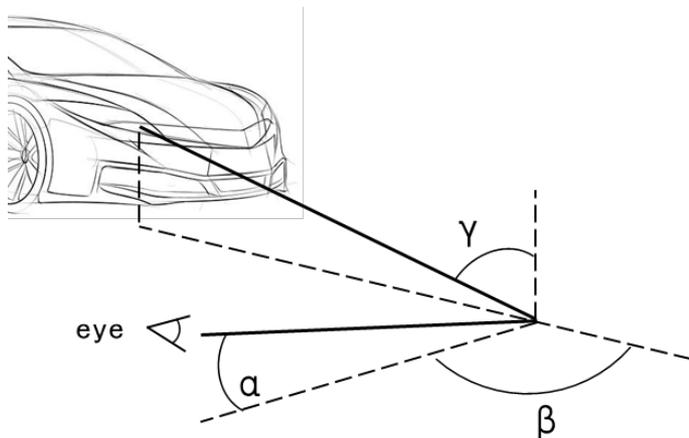
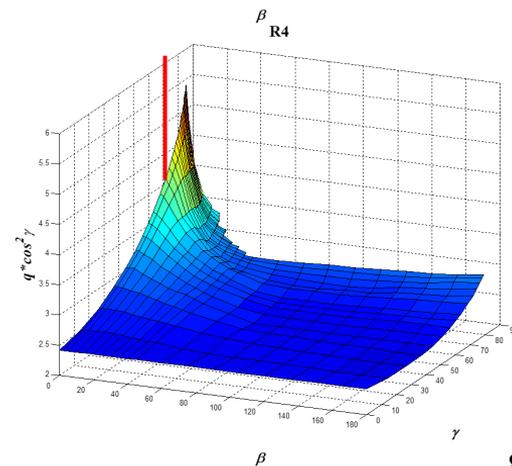
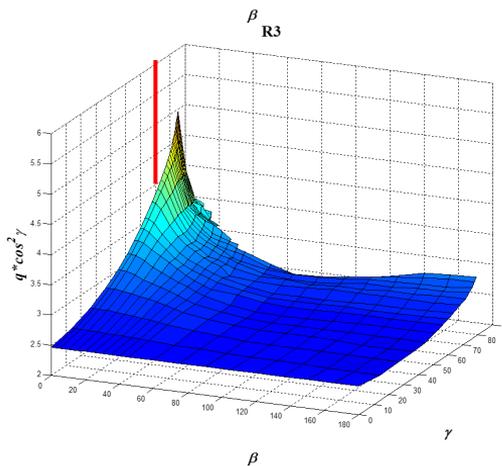
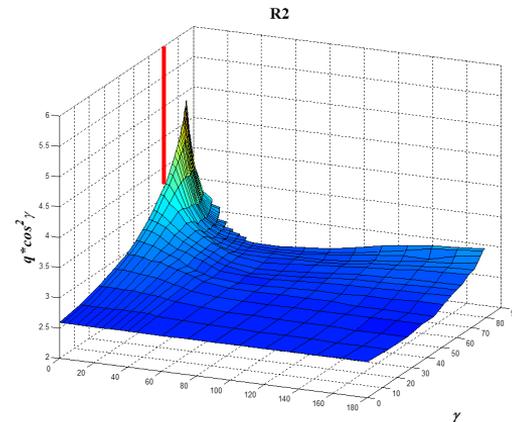
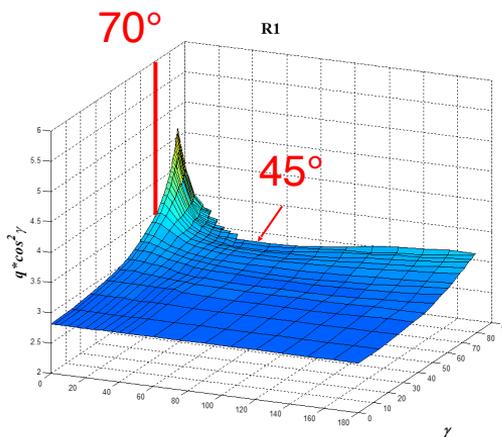
From CIE标准路面 CIE-144-2001





- R路面, r' 随 β 、 γ 的变化关系
Relation between r' and β 、 γ

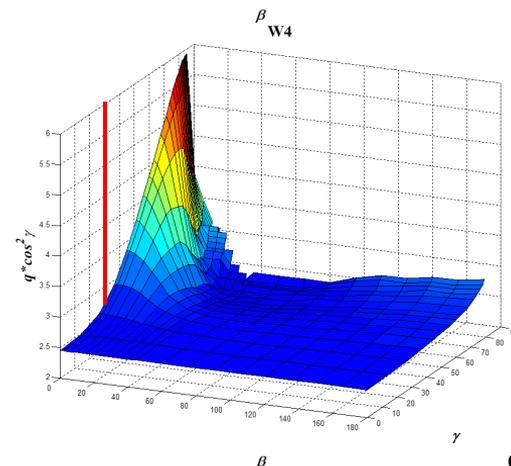
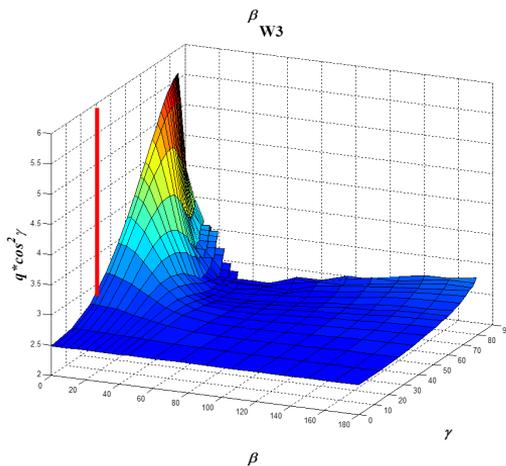
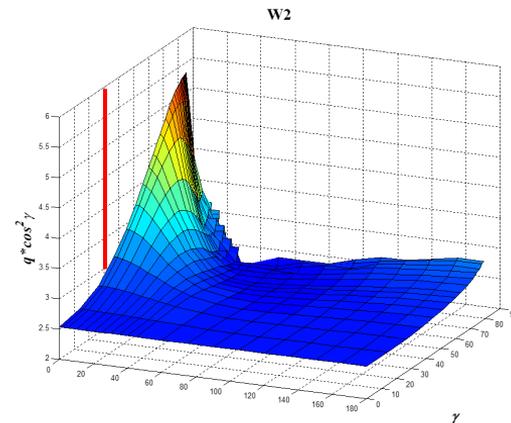
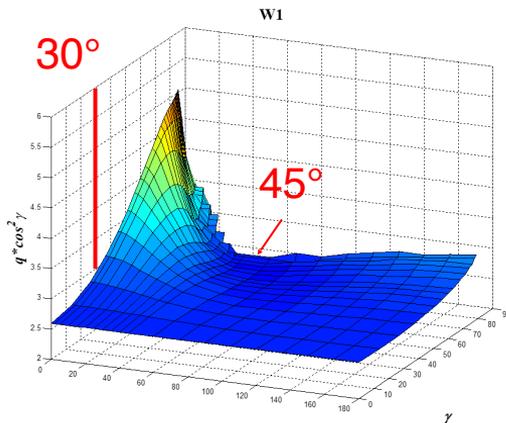
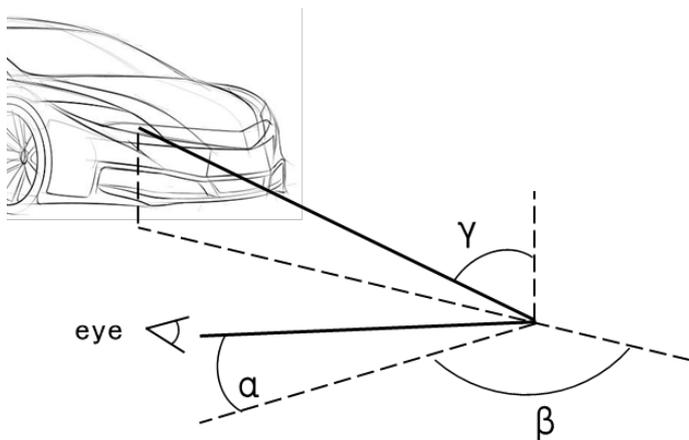
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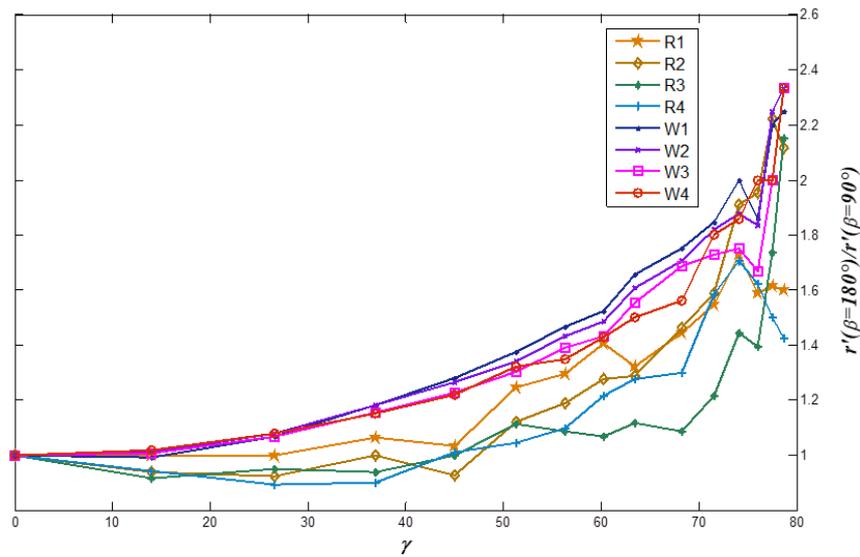
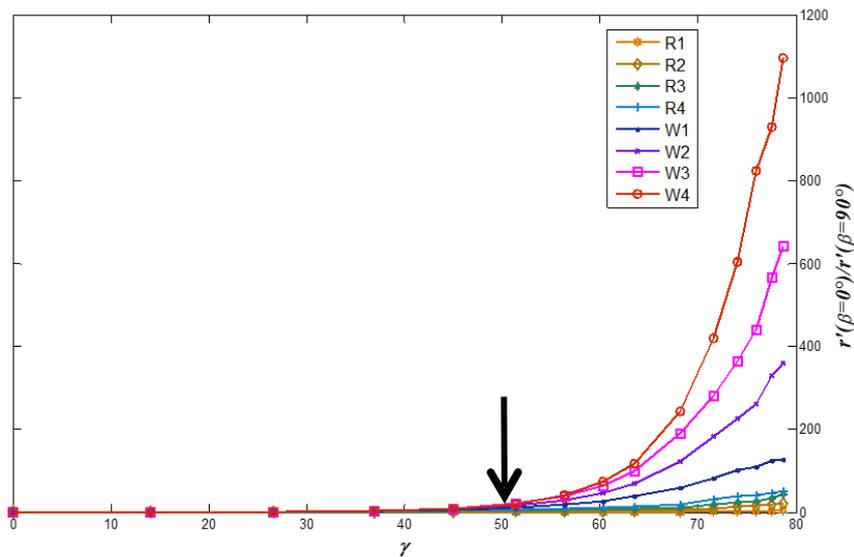
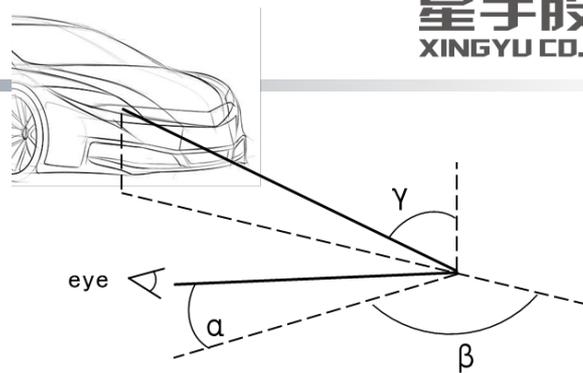
- W路面, r' 随 β 、 γ 的变化关系
Relation between r' and β 、 γ

Class		Table	
Name	S1 range	Name	S1
WI	$S1 < 4.5$	W1	3.2
WII	$4.5 \leq S1 < 7.2$	W2	5.7
WIII	$7.2 \leq S1 < 9.8$	W3	8.7
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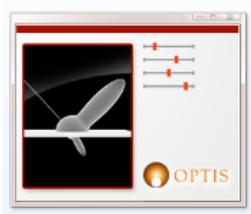


- 比值随 γ 的变化关系
Relation between the ratio and γ

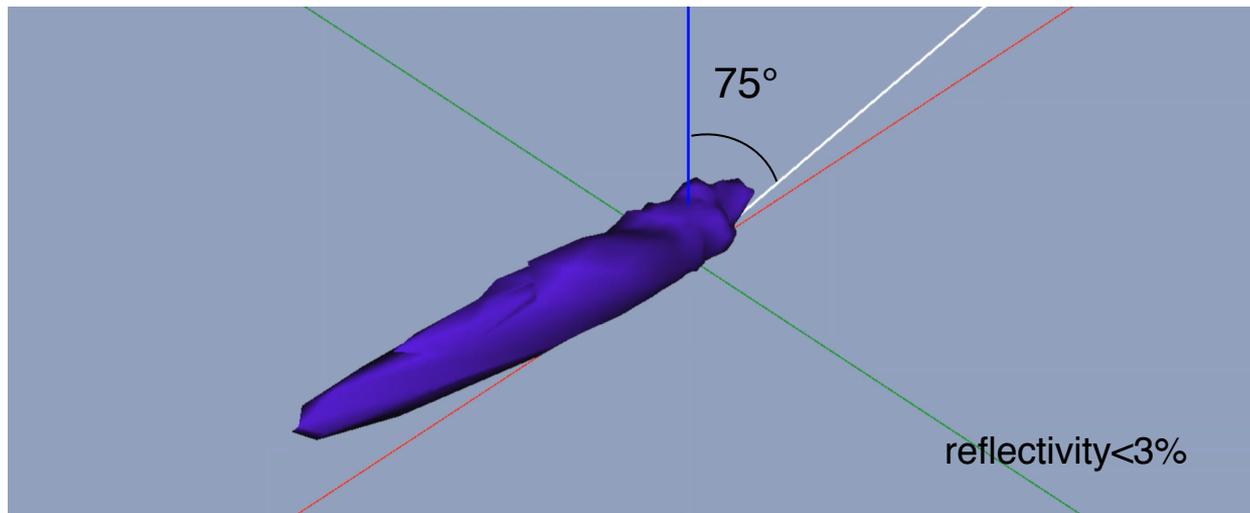




- 样品文件 Material file:



Asphalt road.brdf



- $\beta=0^\circ$ 处的反射率大约是 $\beta=90^\circ$ 的25倍；
- $\beta=180^\circ$ 处的反射率大约是 $\beta=90^\circ$ 的4倍。



特点 Characteristics	影响 Influence
总反射率低 Low reflectivity	灯具效率低 Low efficiency
当 $\gamma < 50^\circ$ 时, r' 几乎不变 When $\gamma < 50^\circ$, r' is almost the same	不必考虑不同观察角度的亮度差别 No need to consider the luminance difference between different viewing angles
当 $\gamma > 50^\circ$ 时, $r'(\beta=0^\circ)r'(\beta=90^\circ)$, $r'(\beta=180^\circ) > r'(\beta=90^\circ)$	要考虑不同观察角度的亮度差别, 严重的会带来眩光风险 Need to consider the luminance difference between different viewing angles, and risk of glare



- 路面应该按何种光泽度设计?

Which type of road used for design?

- 观察者的位置如何考虑?

Where is the viewer?

- A点和B点的亮度如何做到一致?

How to keep the luminance of A and B uniform?





谢谢!

THANK YOU FOR YOUR ATTENTION

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