



ZTA-18-002

Outdoor Lighting Regulations
Ordinance Amendment
City-Wide



Overview

Light Pollution: Light where it isn't wanted.

- In our eyes.
 - In our homes.
 - While driving.
 - While relaxing.
- It can keep our eyes from seeing what we want to see.
- This can result in wasted energy (having been expended on something that is unhelpful)

Overview

Desired Outcomes

- Consolidate various existing outdoor lighting provisions into one comprehensive ordinance;
 - Simple, straightforward ordinance / consolidation
- Conserve energy and natural resources;
- Improve the enjoyment of private property;
 - Outside and Inside
- Increase the health and safety of residents and others;
 - Reduce Automobile Collisions (Vehicles and Pedestrians)
 - Improve sleep conditions
 - Less crime and increased personal safety
- Improve the nighttime ambiance and aesthetics;
- Lessen impacts on natural wildlife and ecosystems;

Summary Matrix

		Issues				
		Trespass	Glare	Health/ Safety	Energy	Skyglow
Tactics	Full Cut-off Fixtures	X	X		X	X
	Height Limitations	X	X	X		
	Illumination Caps	X	X		X	X
	Spectrum Control		X	X		
	Automatic Timers				X	X
	Photometric Plans	X	X	X	X	X

Applicability

All Land Uses Except Single-Family Zoning

- New construction;
- Additions increasing a land use or building by 25% or more;
- Interior remodels affecting 50% or more of the structure.

Single-Family Residential

- Asked by Planning Commission to Develop
- Ultimately, PC recommended that single-family residential standards be optional

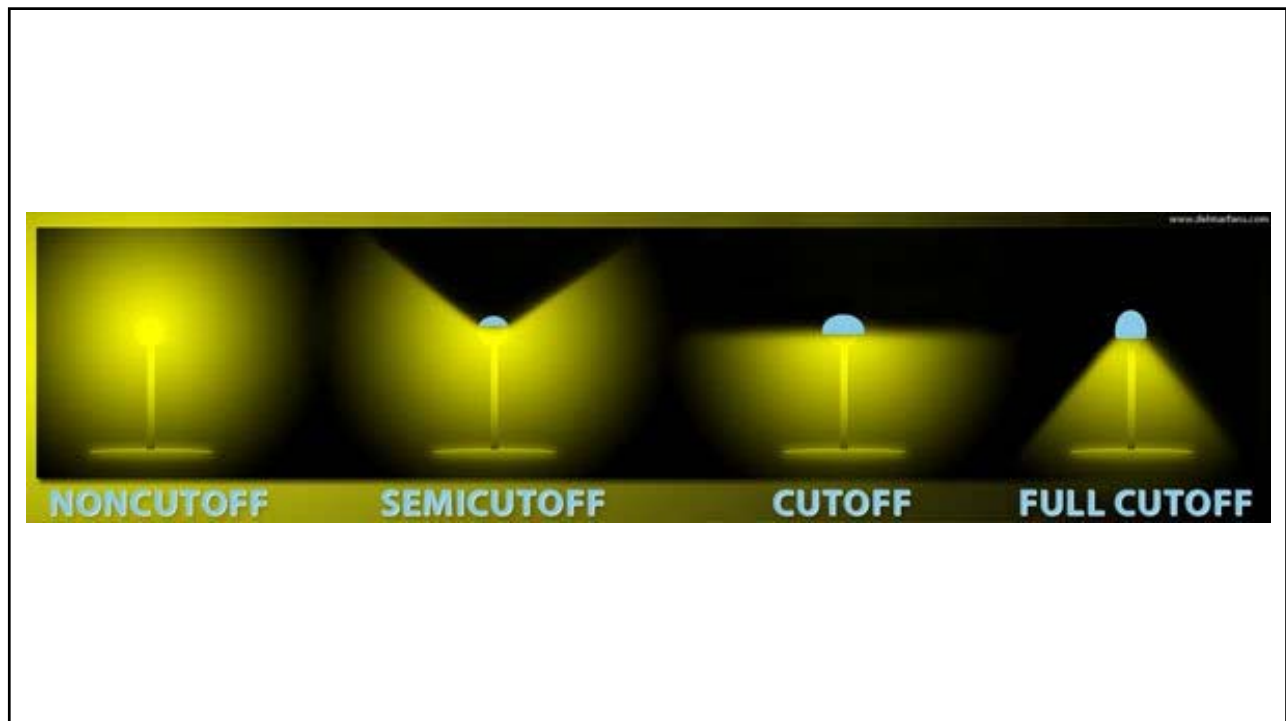
Amendments Since Work Session – June 18

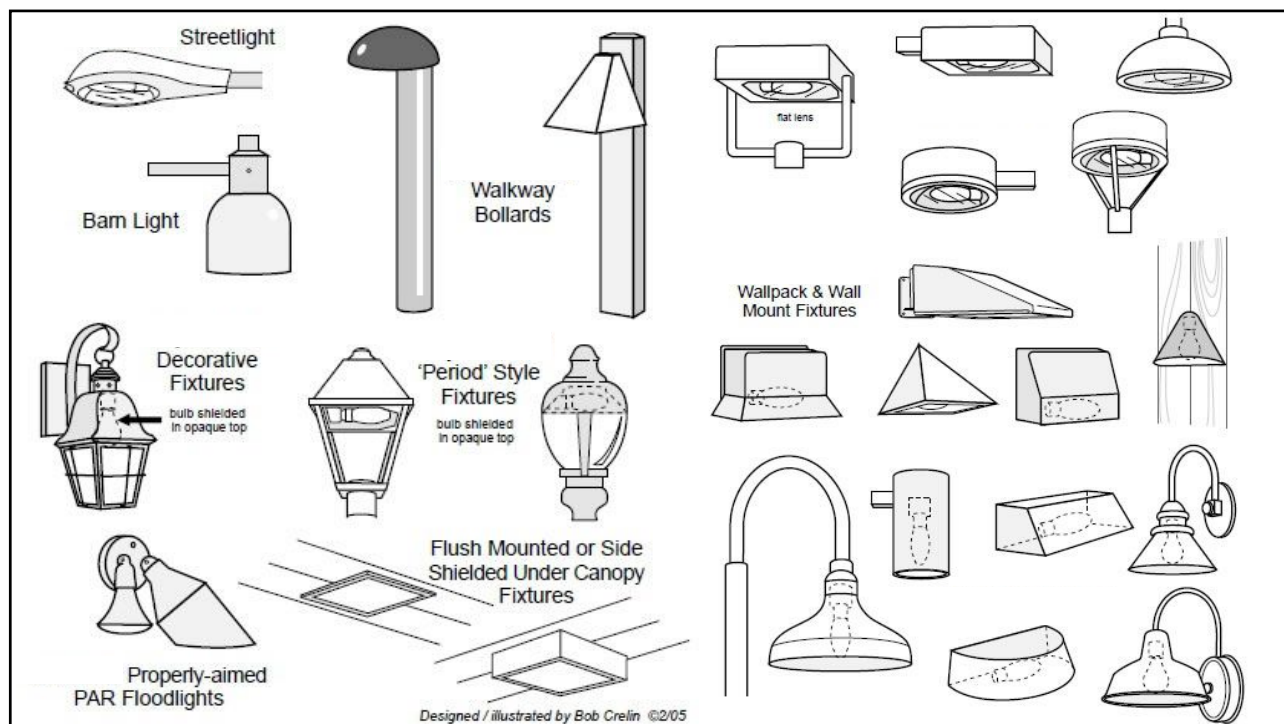
- Net Acre Definition (19.77.020)
- Clarification on Applicability (19.77.030.B) (was an unfinished thought)
- Based on Police Dept Recommendations, Automatic Switching Controls are recommended, not required. (19.77.050.F)
- Seasonal Lighting clarified. (19.77.060.H)

Additional Resources

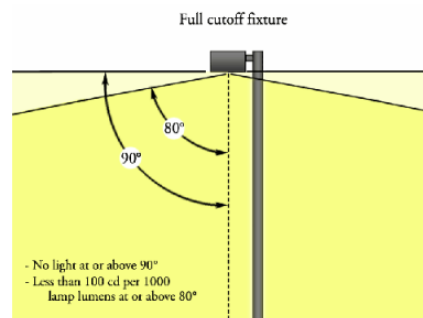






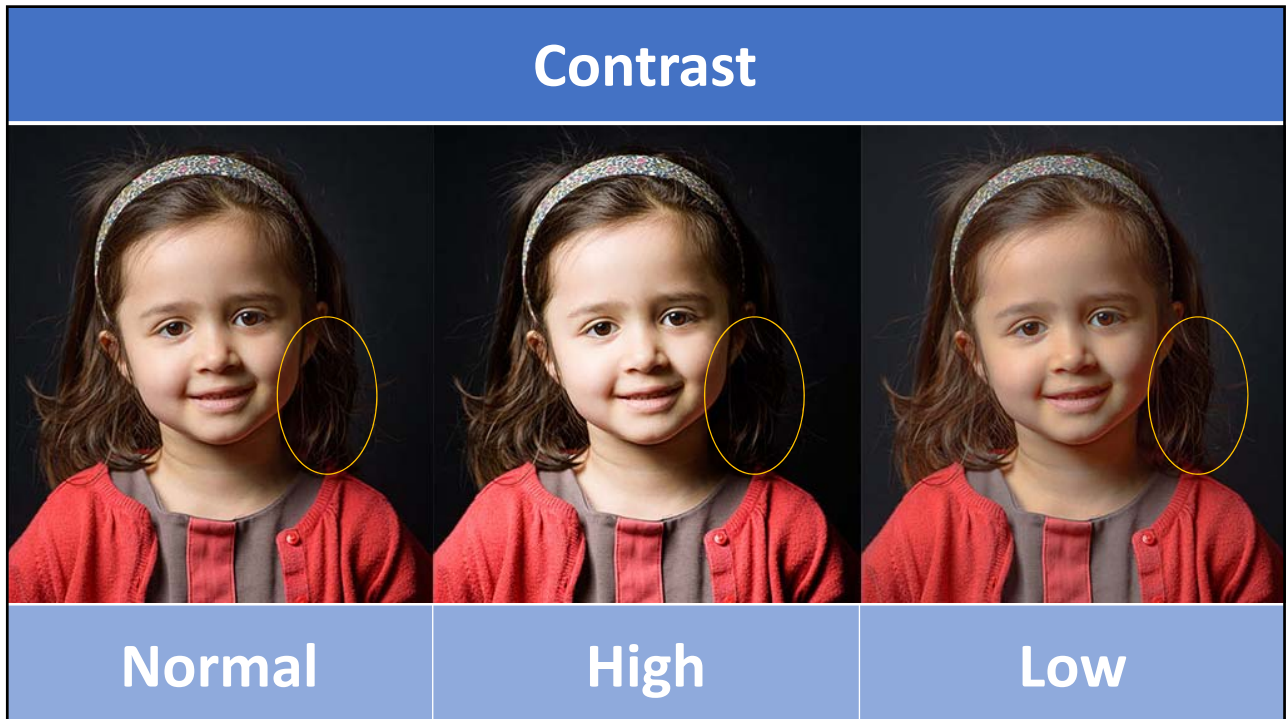
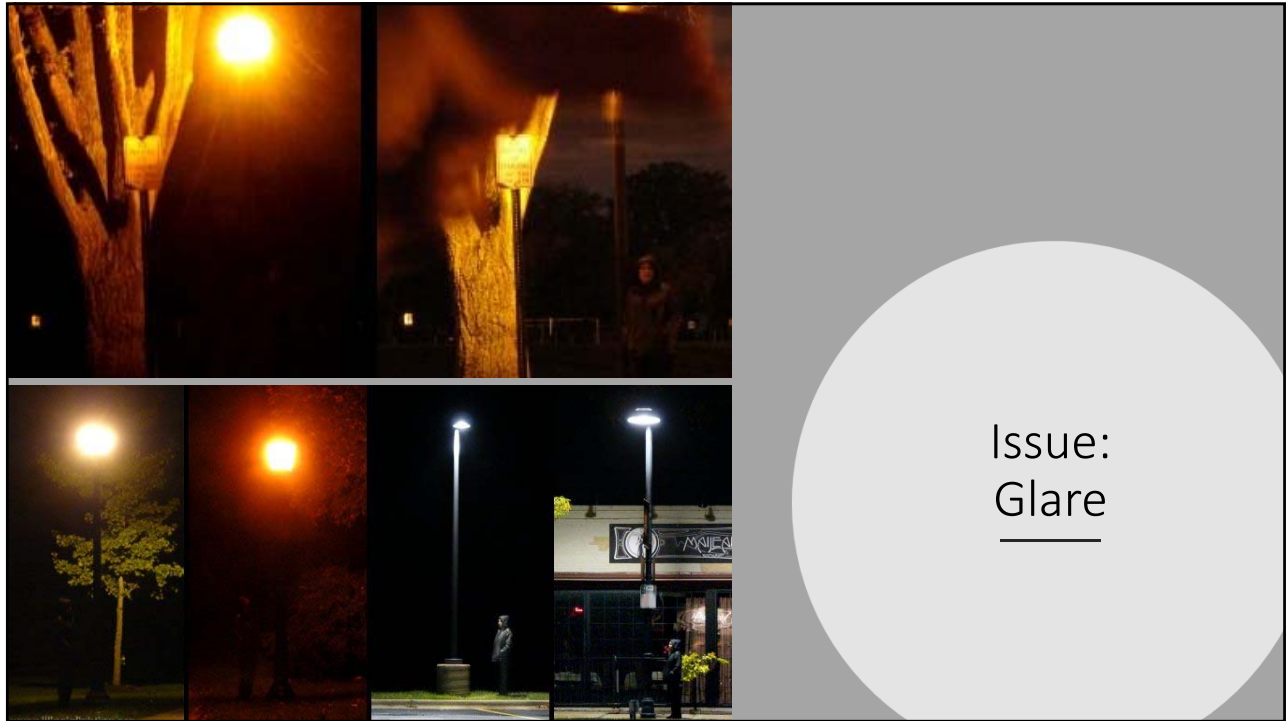


Definition of Acceptable Fixtures: "Full Cut Off", "Fully Shielded", and RLM shield.



- "Full Cut Off" fixtures are independently certified by the manufacturers, and do not allow light to be emitted above the fixture and the fixture reduces glare by limiting the light output to less than 10% at and below 10 degrees below the horizontal.
- If the manufacturer is unable to provide the "cut off" characteristics for a fixture (also called a "luminaire"), the following definition needs to be met, which can usually be determined by a visual inspection:

"Fully Shielded": a fixture constructed and installed in such a manner that all light emitted by it, either directly from the lamp (bulb) or a diffusing element, or indirectly by reflection or refraction from any part of the fixture, is projected below the horizontal. This can be determined by a "field test" or a visual assessment of an operating sample.



Contrast and Night Lighting



Unshielded – Glare

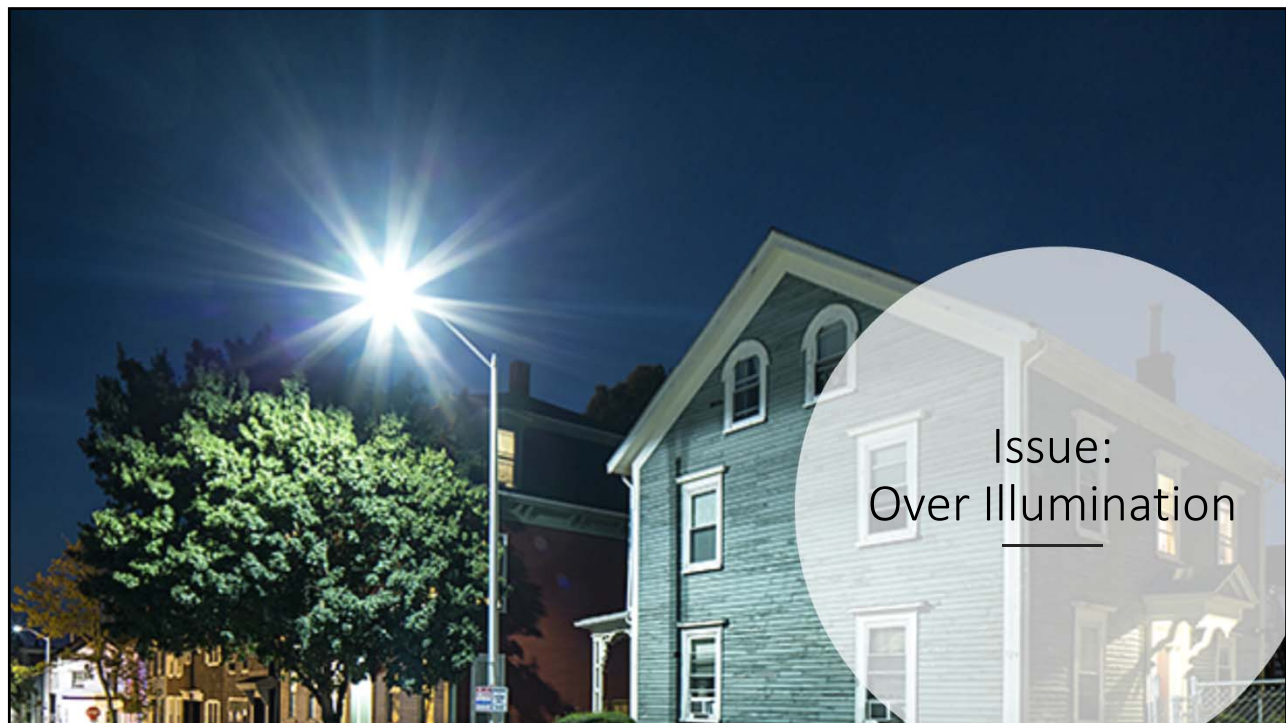


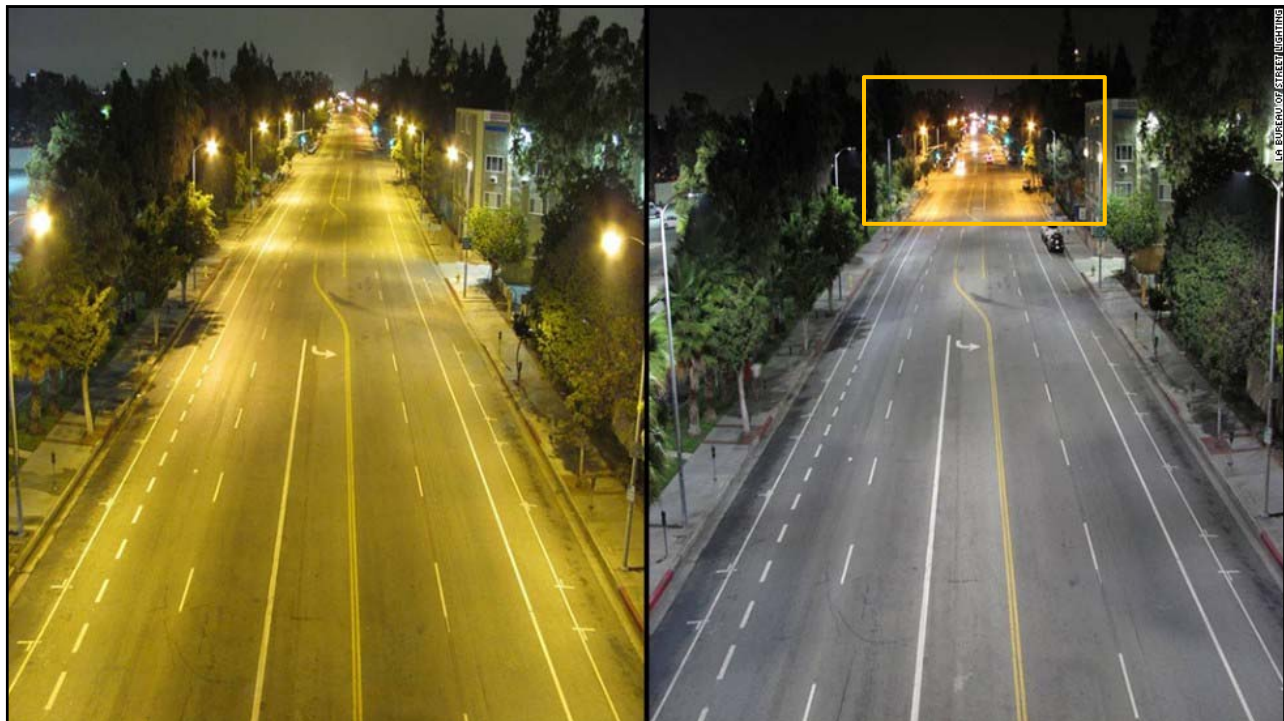
Shielded – Less Glare



Light Glare Summary

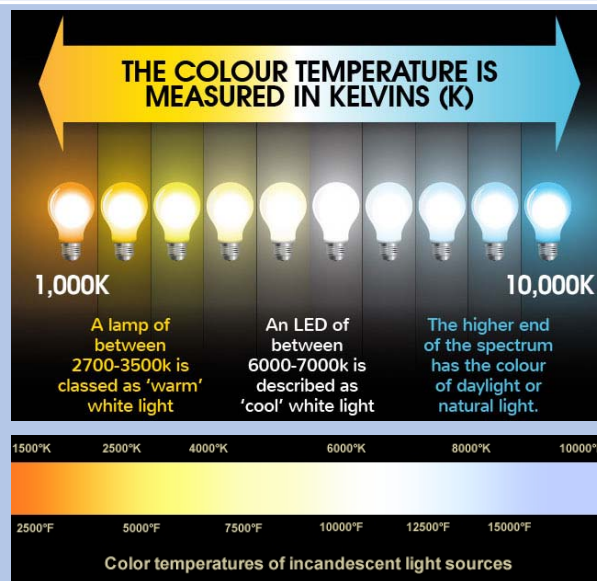
Definition	Light in your field of vision that is intensely brighter than the surrounding light level.
Problem	Your eye loses sensitivity to fainter light.
Results	- Shadows are deeper: - Harder to surveil surroundings - Easier for the bad guys to hide. - Difficulty seeing what needs to be seen. - May result in “disability glare” and “blinding glare”. - May impair night driving and cause accidents.
City Objectives	- Increase Safety – Driving, walking - Reduce Crime – I
Means to Achieve Objectives	1) Shielded light fixtures. 2) Appropriate total light output based on needs. 3) Reduce lighting color to warm hues that reduce contrast. 1) Est. Max CCT / Kelvin Levels.







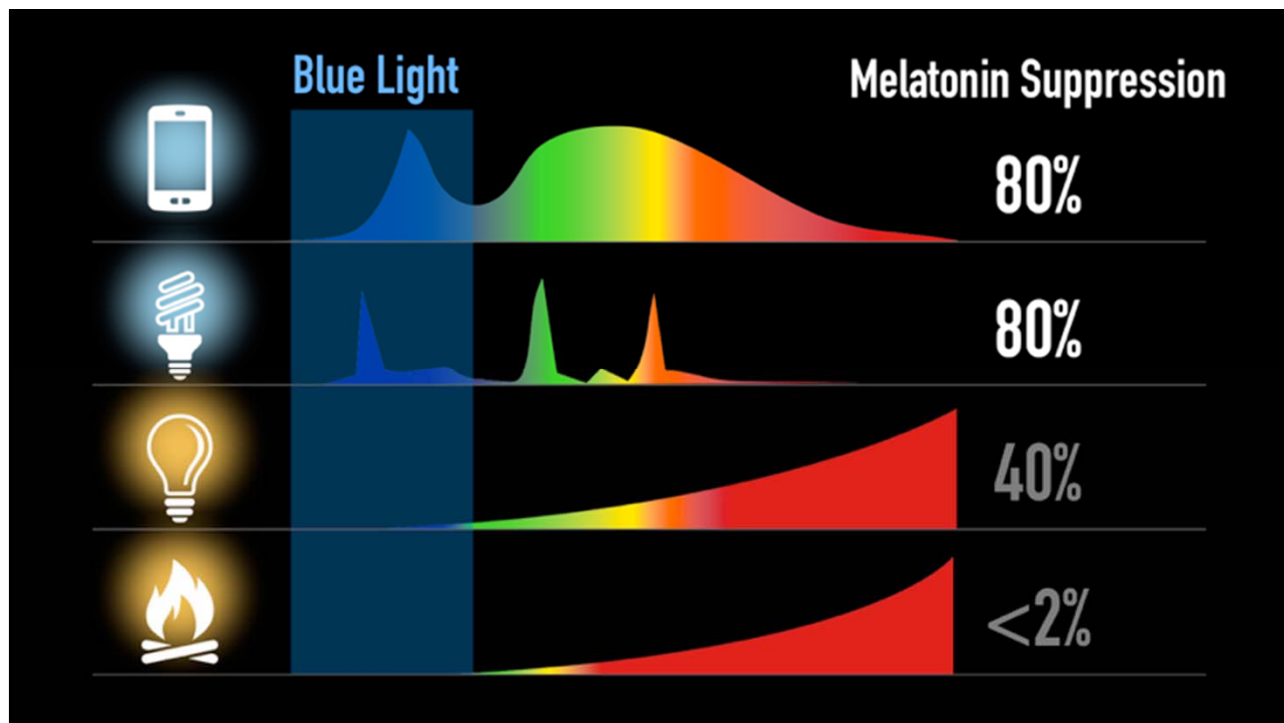
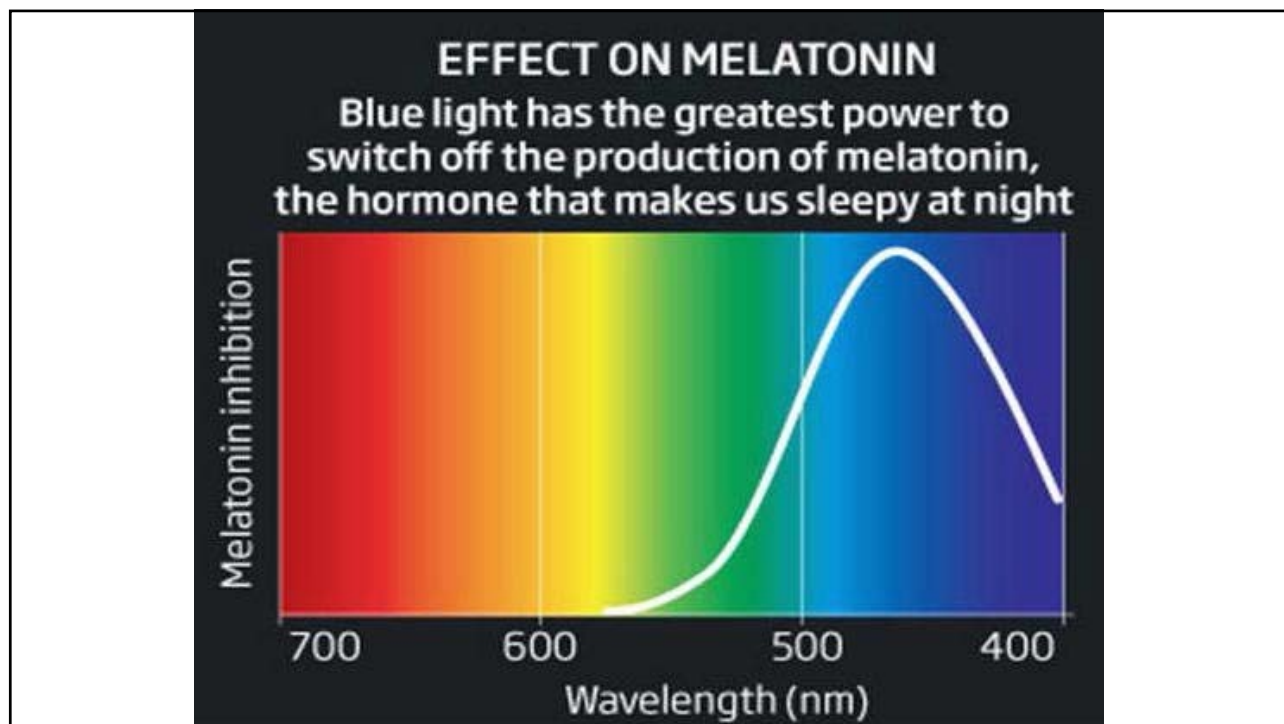
Understanding CCT (kelvins)



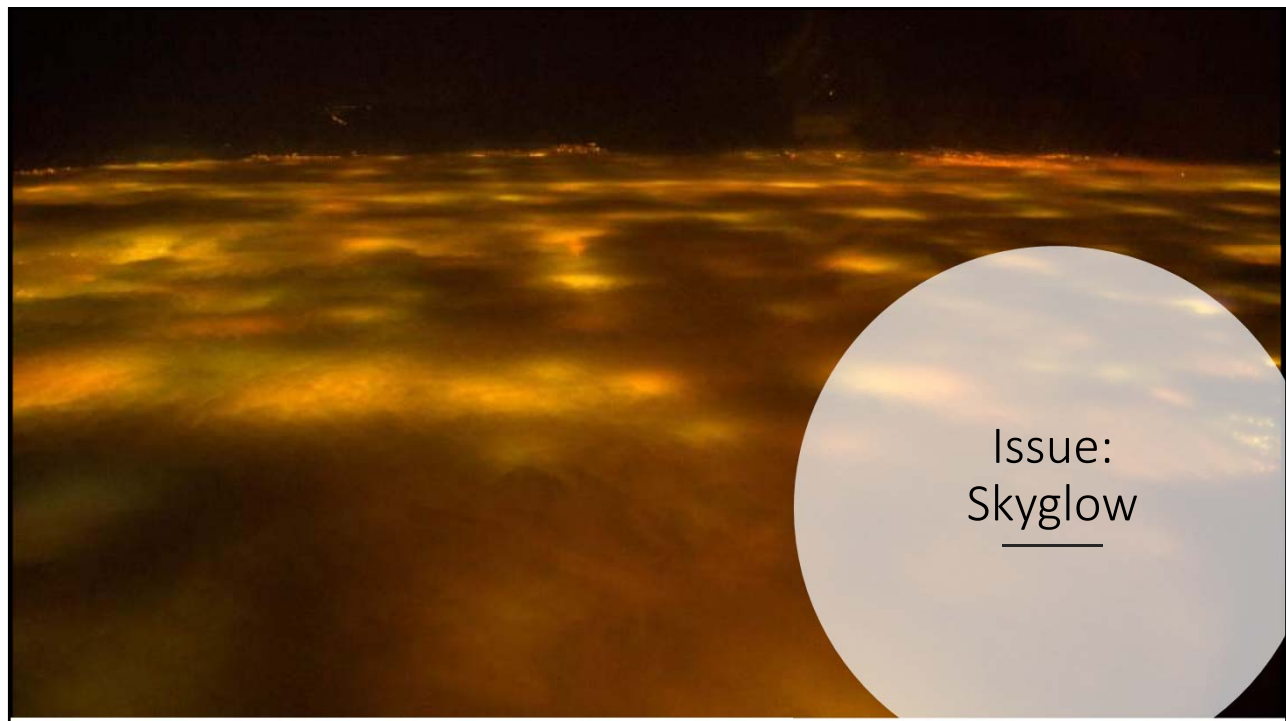
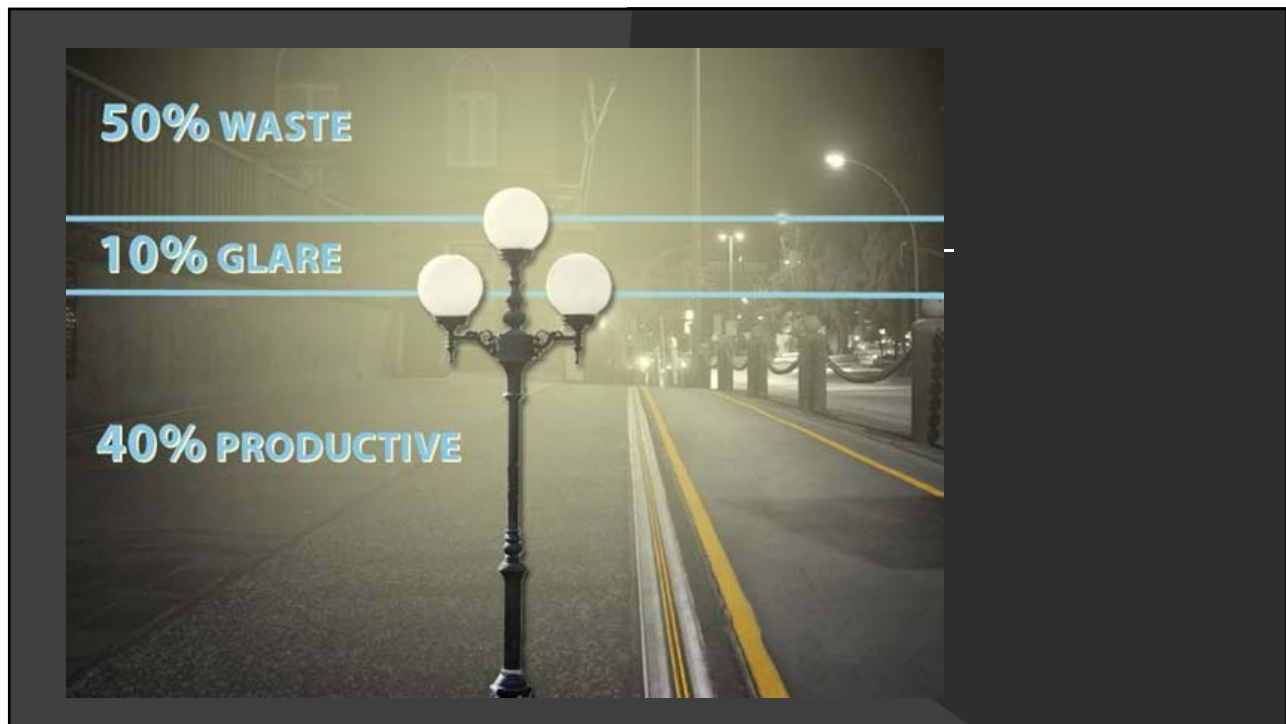
Warm Light

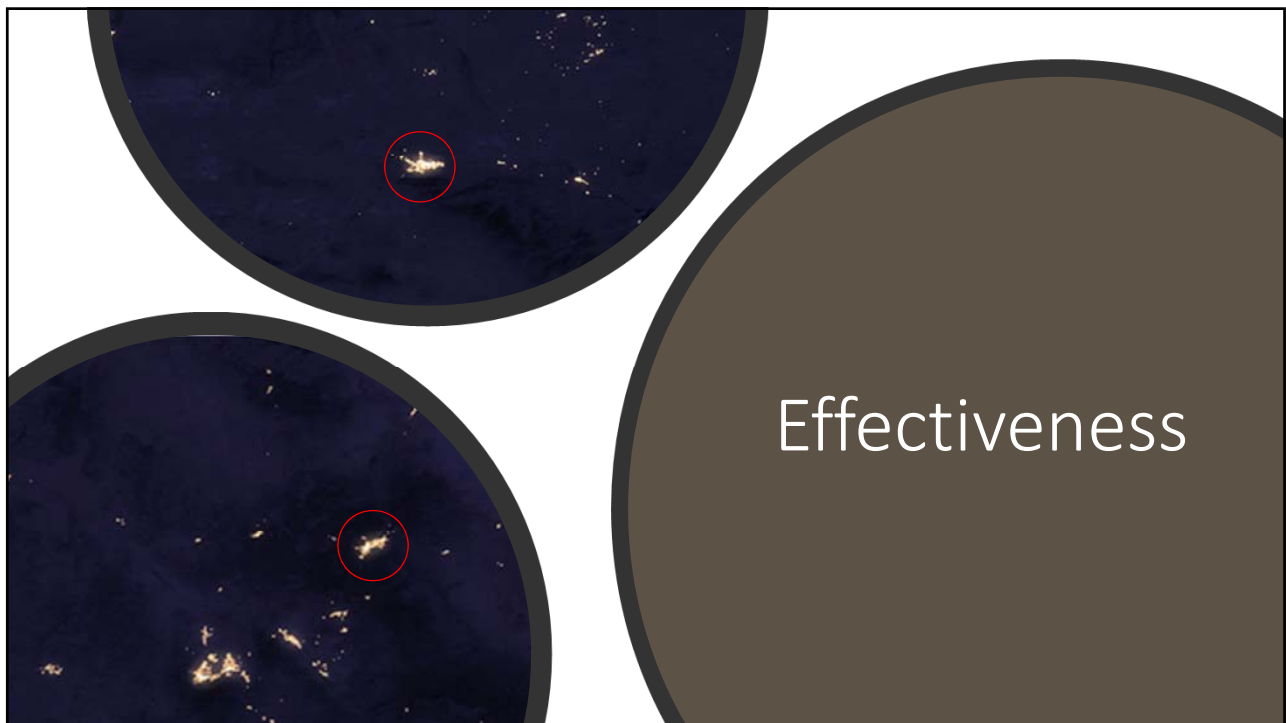
Blue Light











From The Ground Up I: Light Pollution Sources in Flagstaff, Arizona

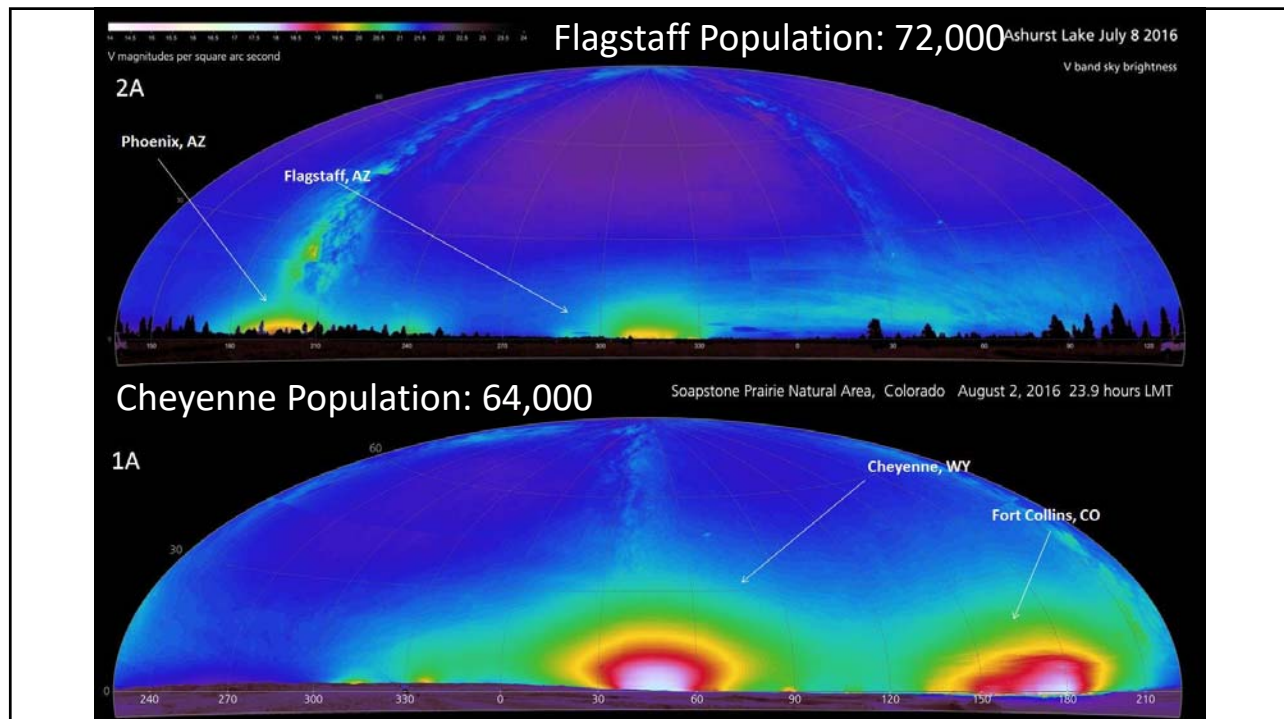
Christian B. Luginbuhl, G. Wesley Lockwood, Donald R. Davis, Kevin Pick and Jennifer Selders



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February), pp. 185-203
(19 pages)

Published by:
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We show that the adoption of the 1989 lighting code has reduced the growth of Flagstaff's sky glow from an expected 43% without the code to just 17%, while the population has increased by about 25%. If all lighting in Flagstaff could be brought within the standards of the 1989 code, Flagstaff sky glow could be reduced to 64% of the 2003 value; if all lighting were fully shielded total output would be reduced to 47%. By far the majority of the improvement in reducing sky glow has resulted from the lumens per acre caps of the 1989 code; the shielding



Applicability

Option A

- New development (excluding SFR)
- Uses/structures increased in size by 25% or more (excluding SFR)

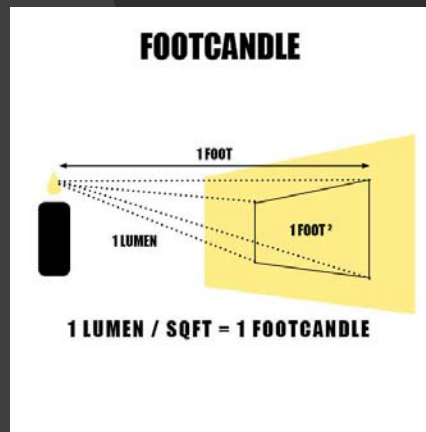
Option A

- New development (including SFR)
- Uses/structures increased in size by 25% or more, SFR increased by 50%

Request

- Provide Preliminary Feedback on Scope/Direction

Visual Glossary – Foot Candle



Sources Consulted



Dark Sky Association



Illuminating Engineering Society of America



American Planning Association



Illinois Coalition of Responsible Lighting



Intermountain West Municipalities

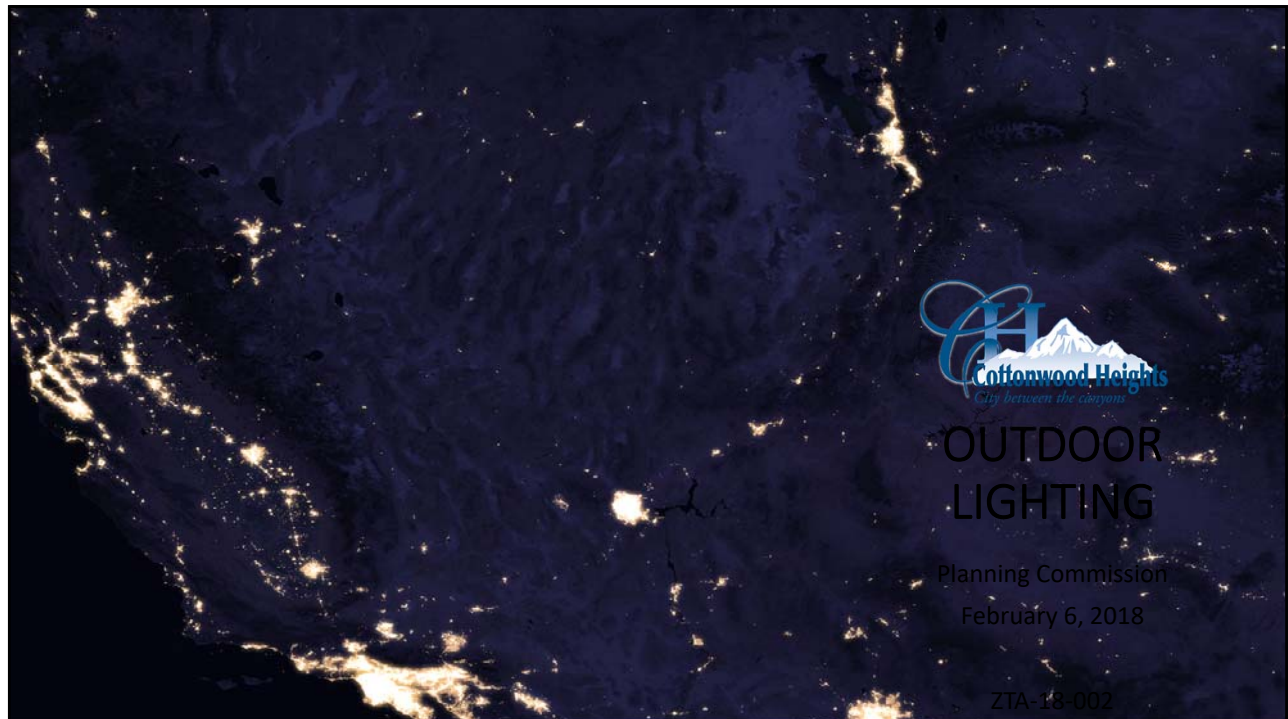


Scores of Other Sources



SUB-18-002

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Ordinance Amendment
City-Wide



OUTDOOR LIGHTING

Planning Commission
February 6, 2018

ZTA-18-002

Sources Consulted

☆☆	Dark Sky Association
💡	Illuminating Engineering Society of America
📐	American Planning Association
👥	Illinois Coalition of Responsible Lighting
🏢	Intermountain West Municipalities
📁	Scores of Other Sources

Problem Overview

- Light Pollution: Light where it isn't wanted.
 - It can keep our eyes from seeing what we want to see.
 - It can invade our life where we don't want it to.
- Improper use of light may create:
 - Light Trespass
 - Glare
 - Over Illumination
 - Color
 - Wasted Energy
 - Skyglow

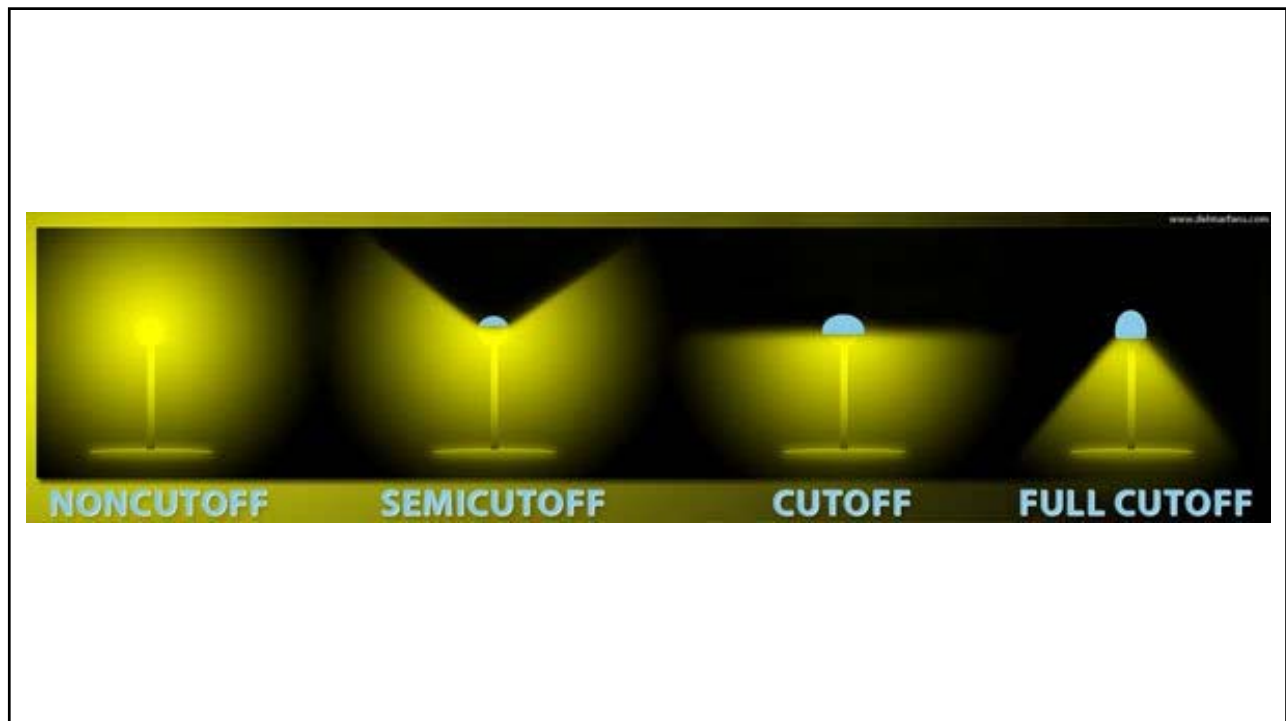
Desired Outcomes

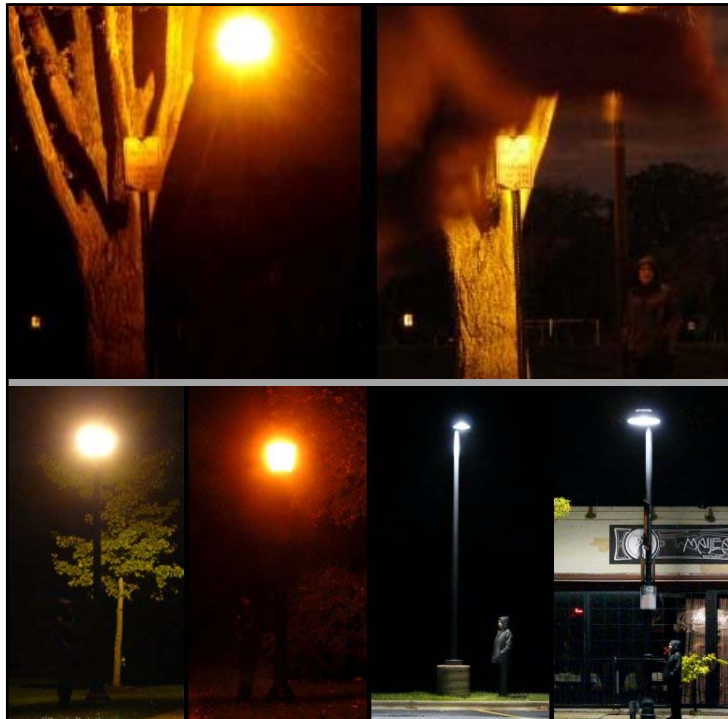
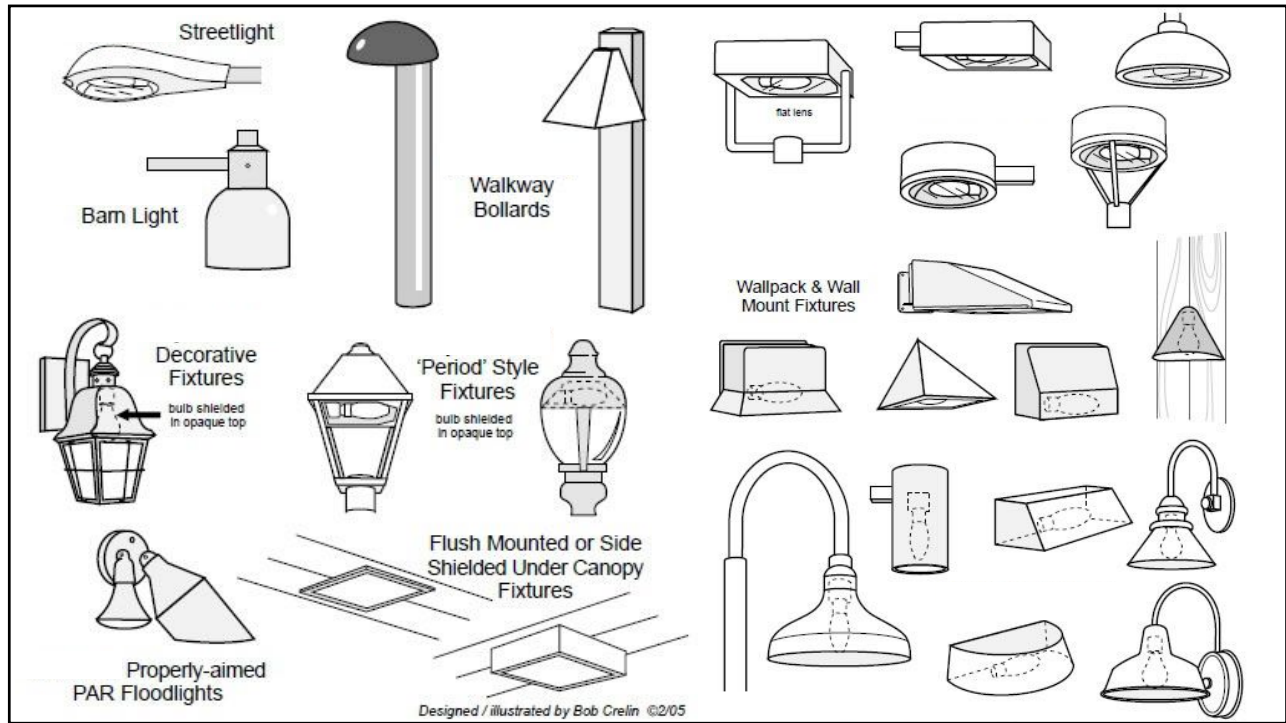
- Improve Enjoyment of Personal Property
 - Outside and Inside
- Increase Health and Safety of Residents and Visitors
 - Reduce Automobile Collisions (Vehicles and Pedestrians)
 - Improve sleep conditions
 - Less crime and increased personal safety
- Improve Nighttime Ambience
- Conserve Natural Resources
- Administratively straightforward and enforceable

Issues

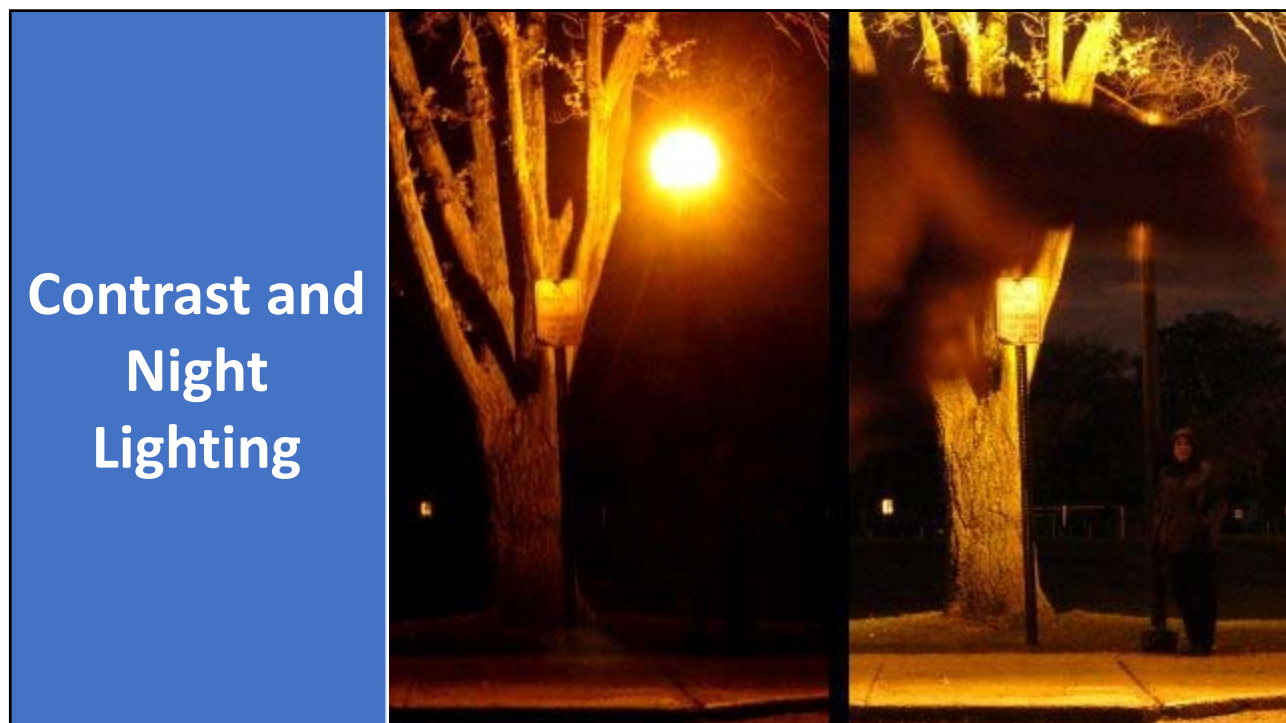
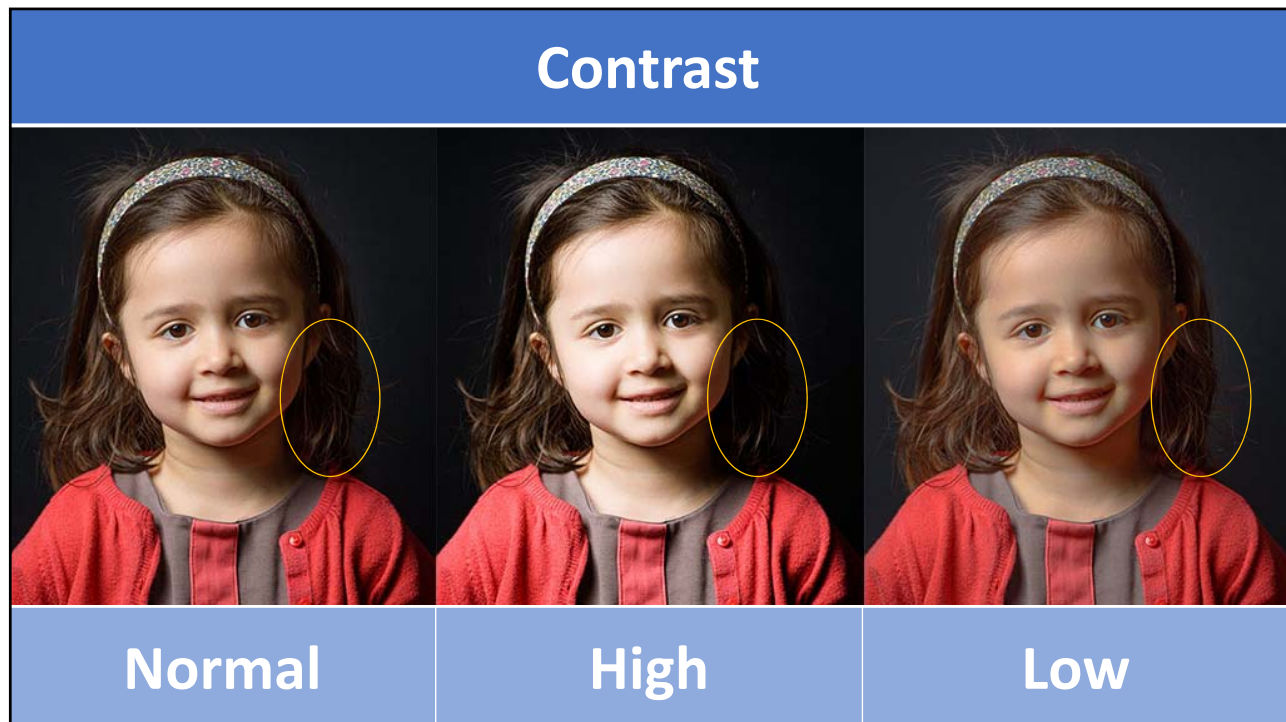
Tactics		Trespass	Glare	Color	Energy	Skyglow

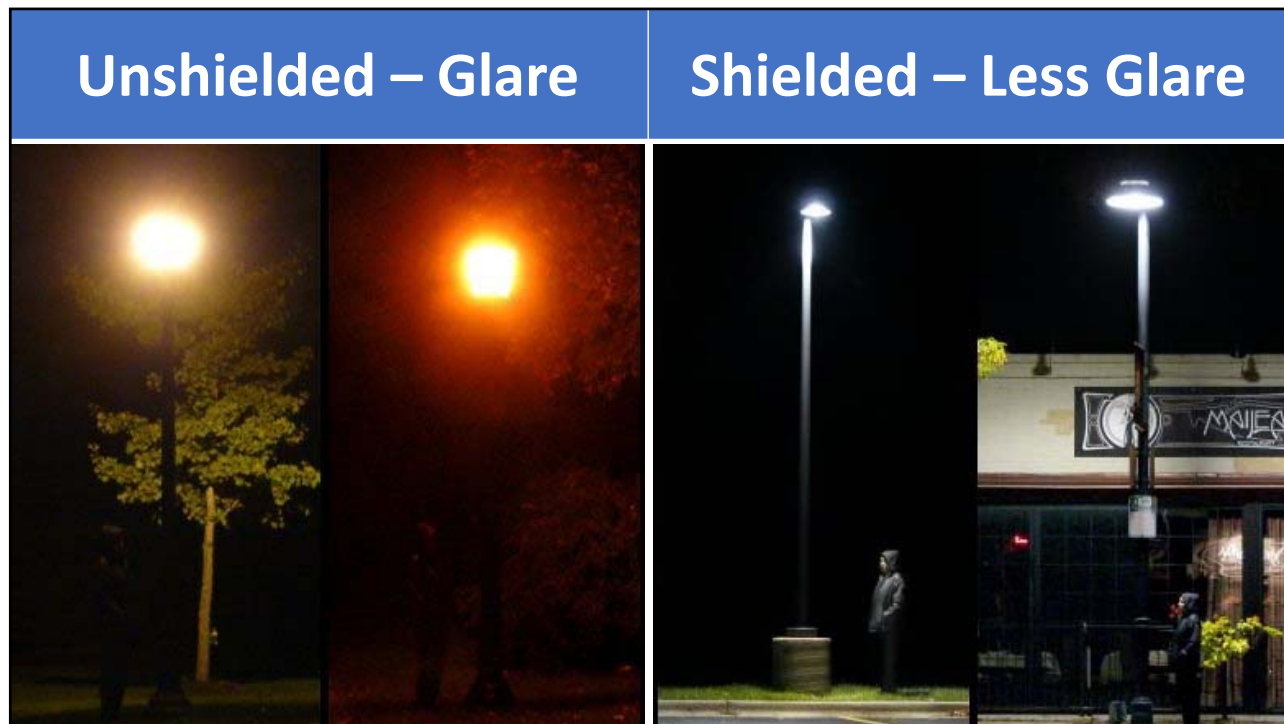






Issue:
Glare

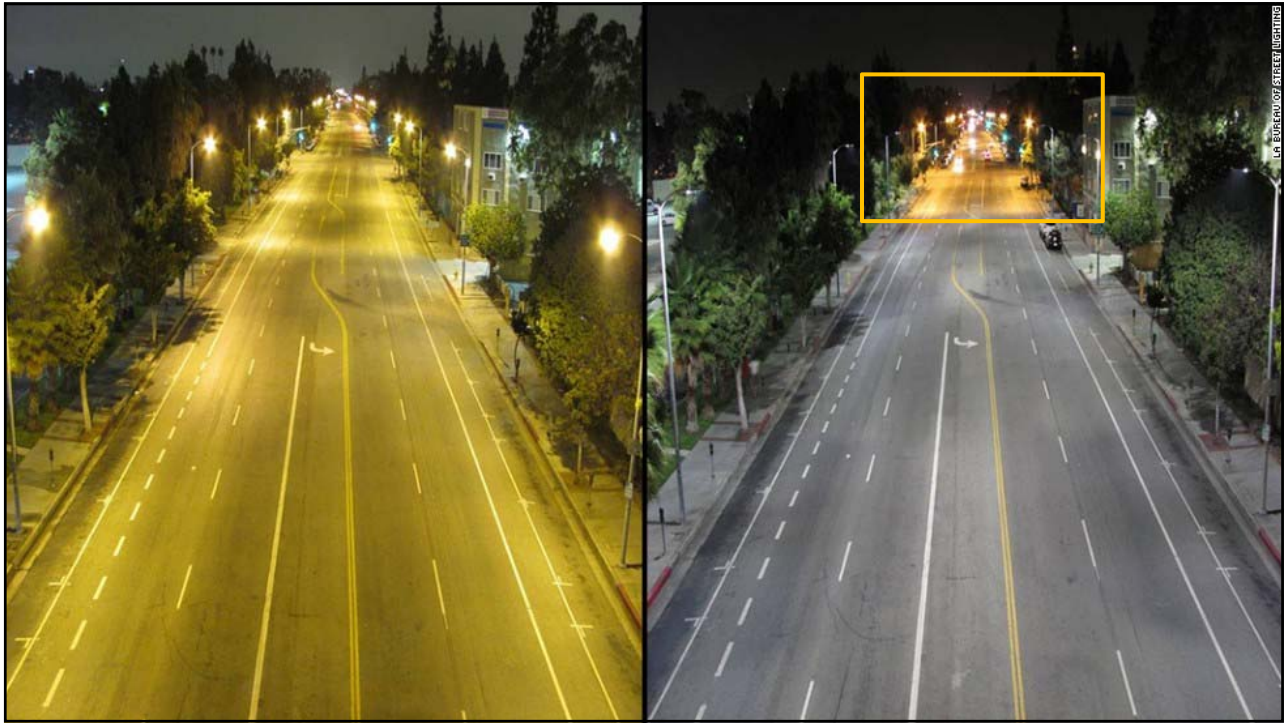




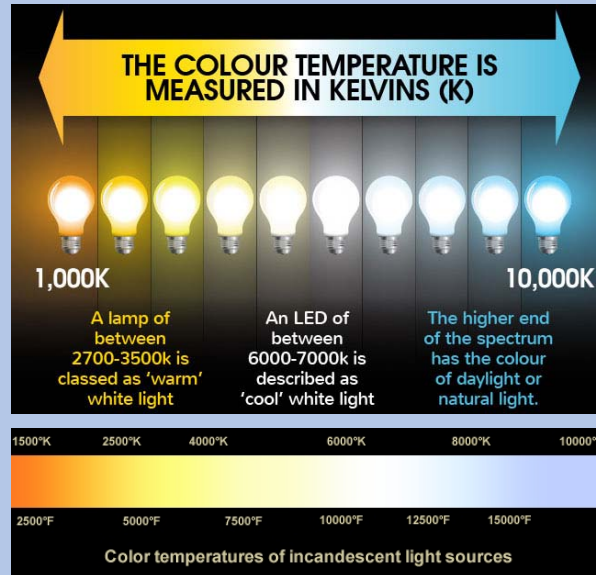
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City Objectives	- Increase Safety – Driving, walking - Reduce Crime – I
Means to Achieve Objectives	- Shielded light fixtures. - Appropriate total light output based on needs. - Reduce lighting color to warm hues that reduce contrast. - Est. Max CCT / Kelvin Levels.





Understanding CCT (kelvins)

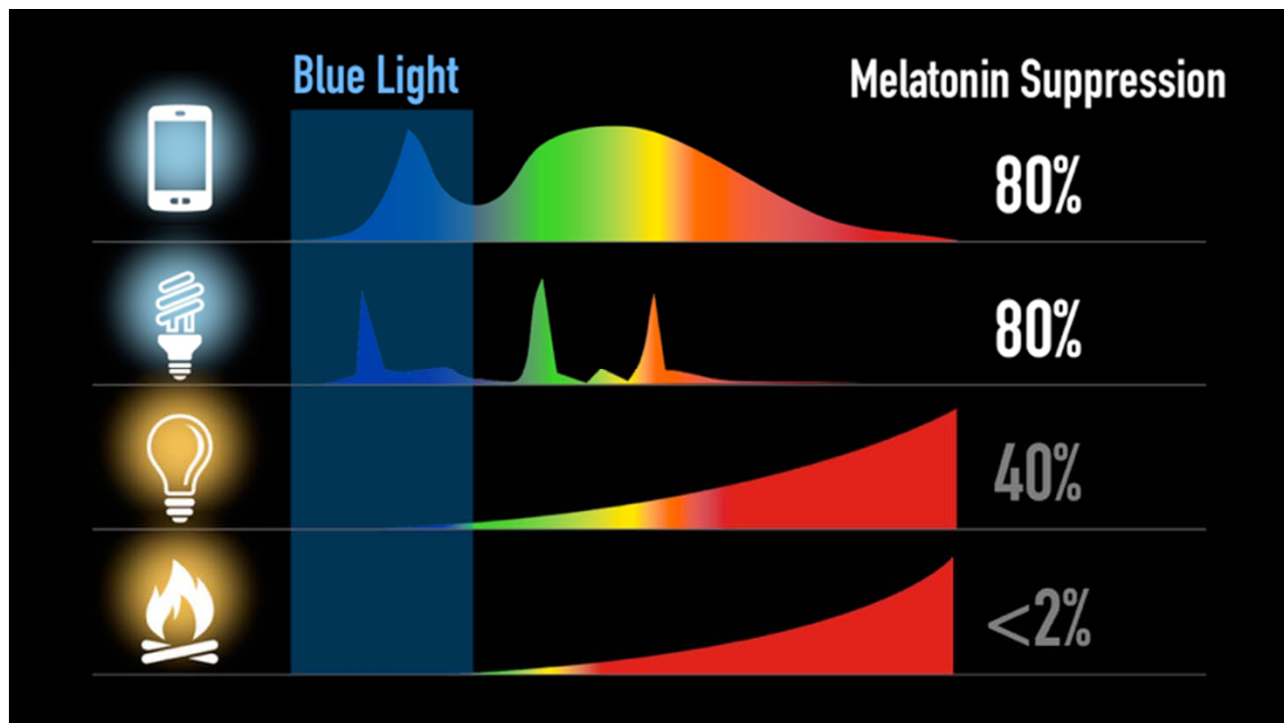
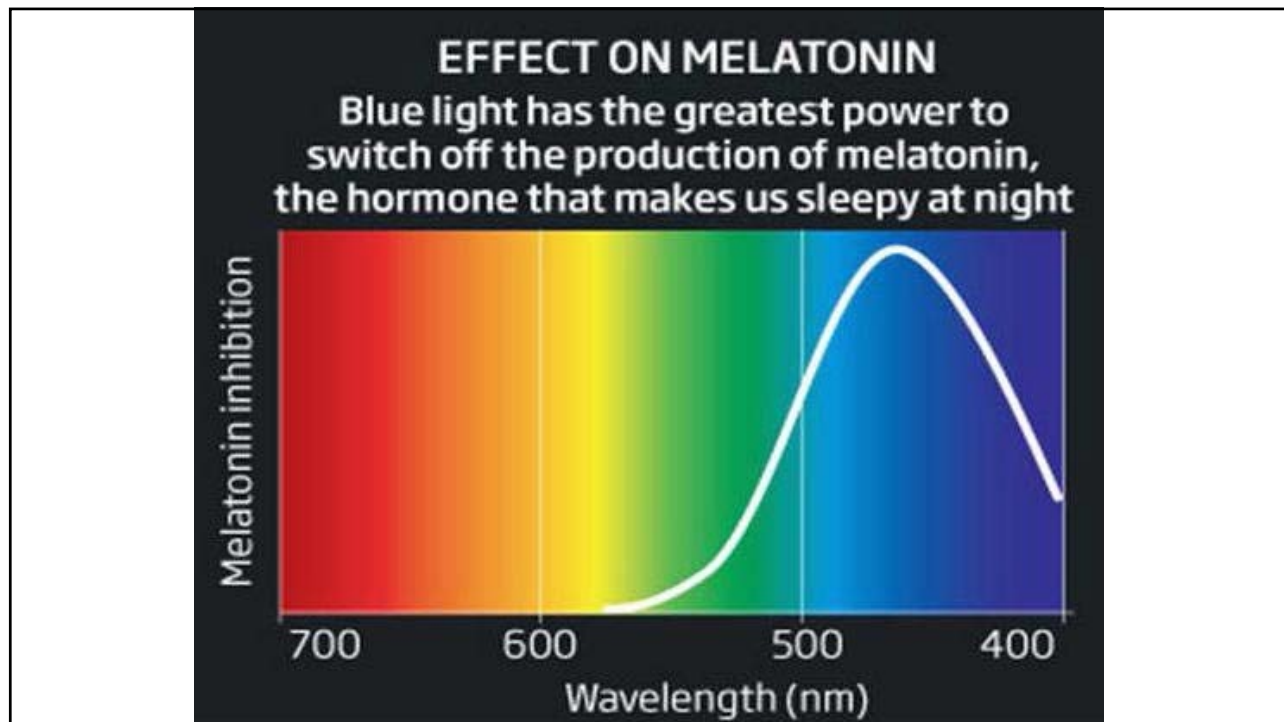


Warm Light

Blue Light



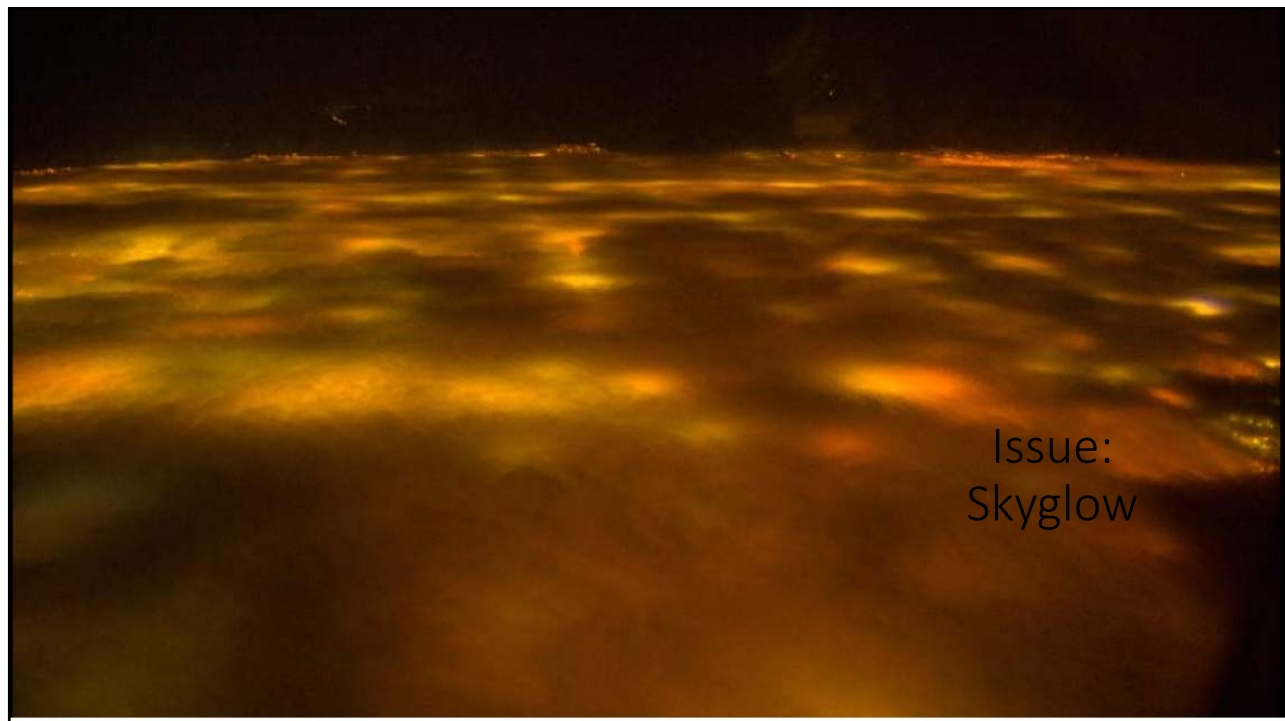
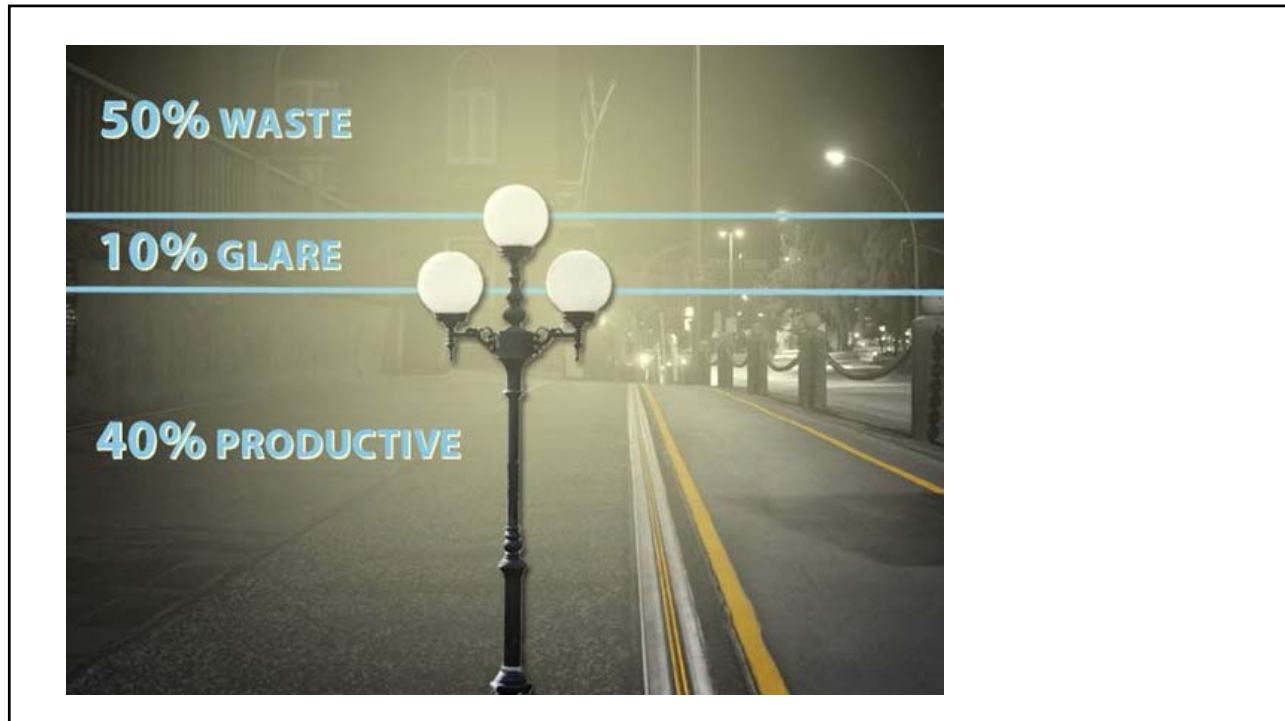


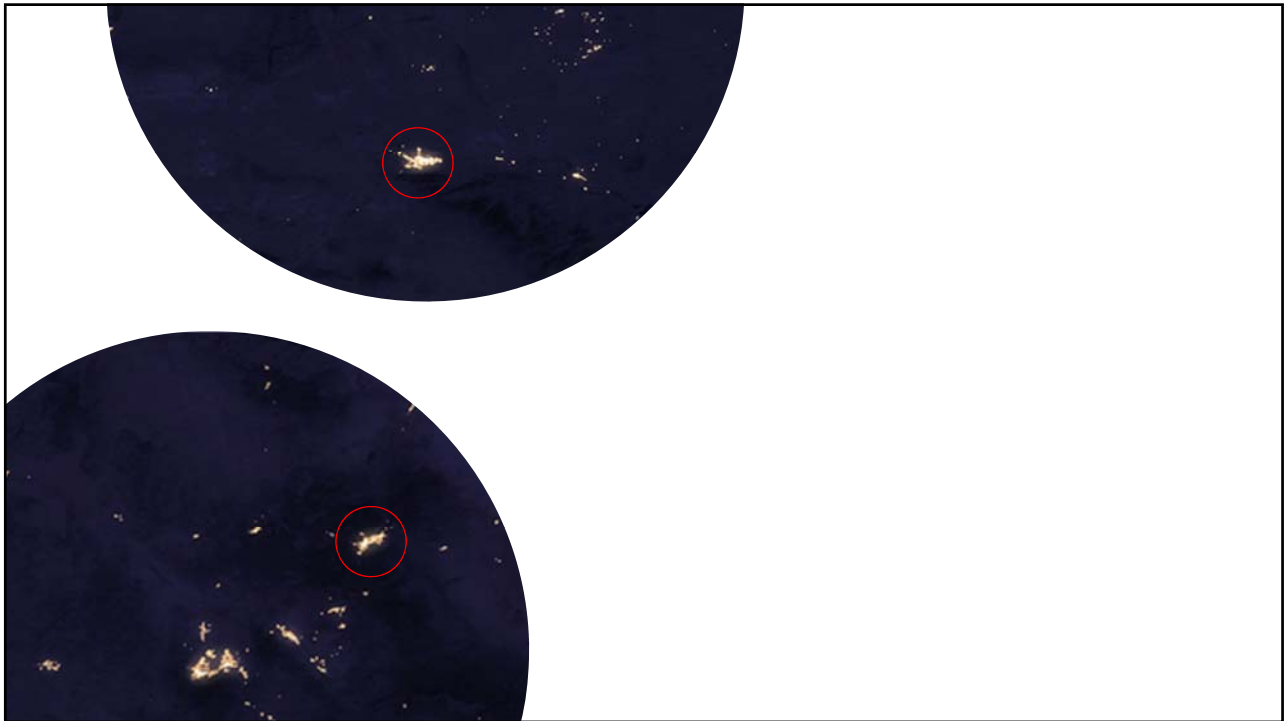
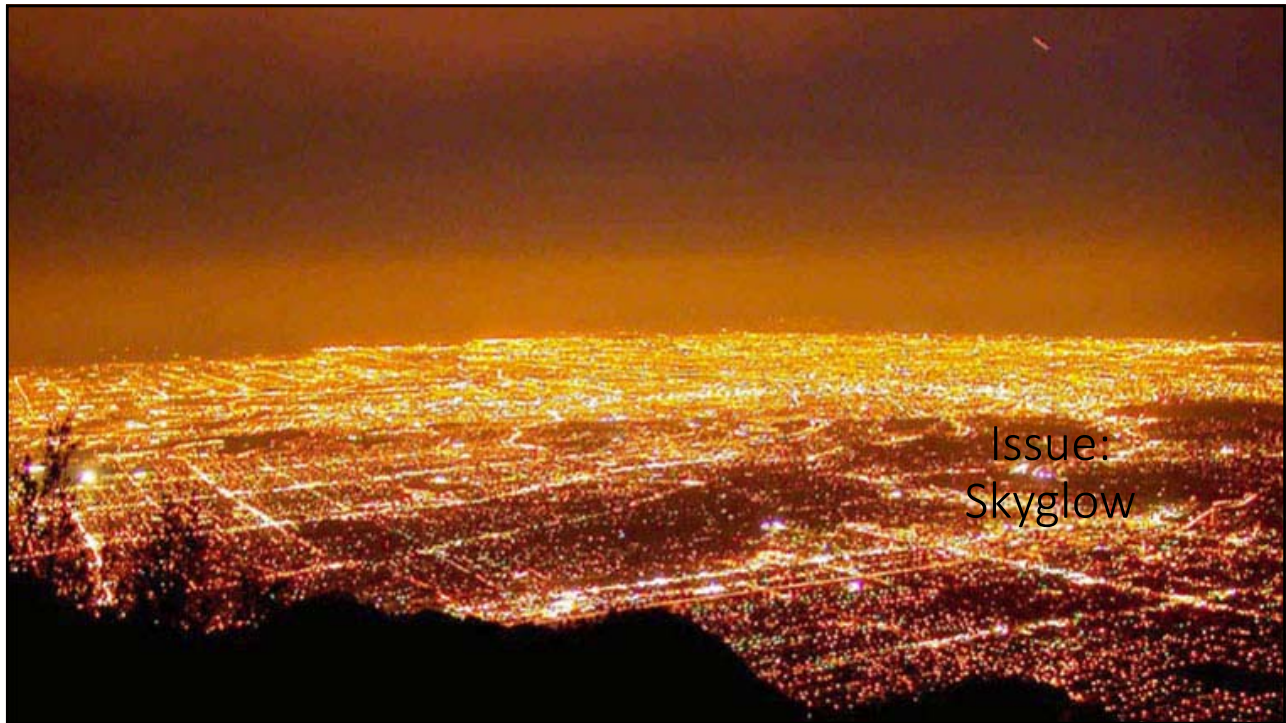




Issue:
Energy Waste







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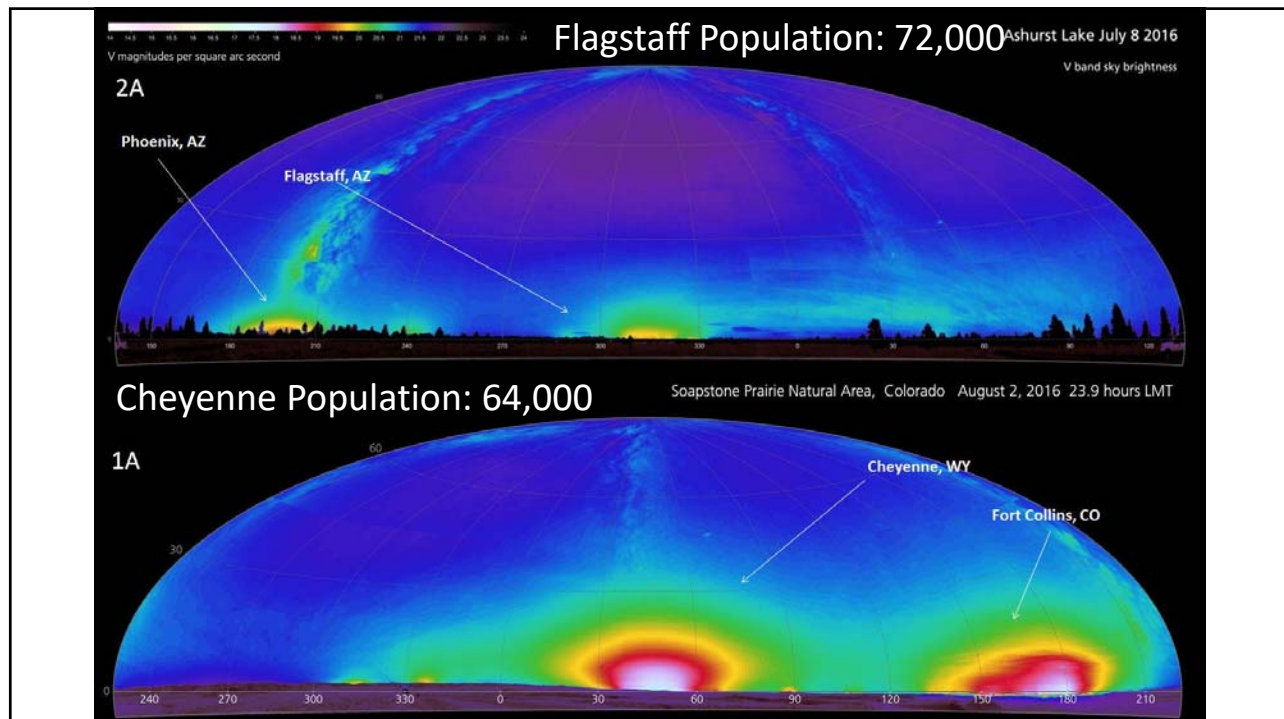
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Methods to Achieve Desired Outcomes

Tactics	Full Cut-off	X	X		X	X
	Height Limitations	X				X
	Illumination Max.	X	X		X	X
	Spectrum Control		X	X		
	Automatic Timers				X	X
	Photometric Plan	X	X	X	X	X

Tactic Details

- Full cut-off light fixtures are required for any light illuminating the equivalent of a standard 60w bulb.
- A maximum height of 18 feet for all light fixtures.
- All light fixtures are to be pointed downward.
- Maximum lighting output is regulated by establishing a maximum average illumination of the ground.
- Limits on the amount of light that may spill over a property line, measured at eye-level.
- Limiting lights to warm (red/orange/yellow) hues in the color spectrum.
- Requires walkway lighting.
- Requires automatic shut-off one-hour after sun down or the close of business (except for security lighting – max 25% of fixtures).
- Establishes a maximum amount of illumination per net acre.
- Establishes exceptions for a limited list of land uses.
- Amend city street light standards for consistency and adopts by ordinance.
- If this ordinance is adopted, all existing lighting provisions in the City code will be consolidated into this chapter.

Applicability

Option A

- New development (excluding SFR)
- Uses/structures increased in size by 25% or more (excluding SFR)

Option A

- New development (including SFR)
- Uses/structures increased in size by 25% or more, SFR increased by 50%

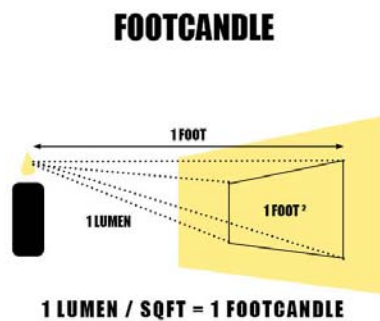
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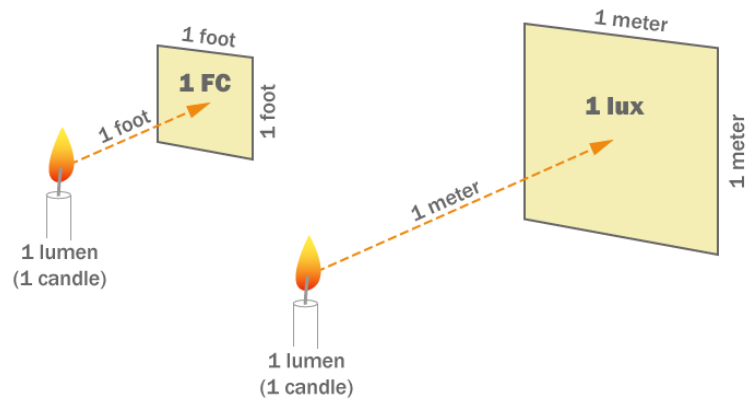
Next Steps

- Finalize Proposal for Consideration by the Planning Commission
- Planning Commission to Make Recommendations to the City Council

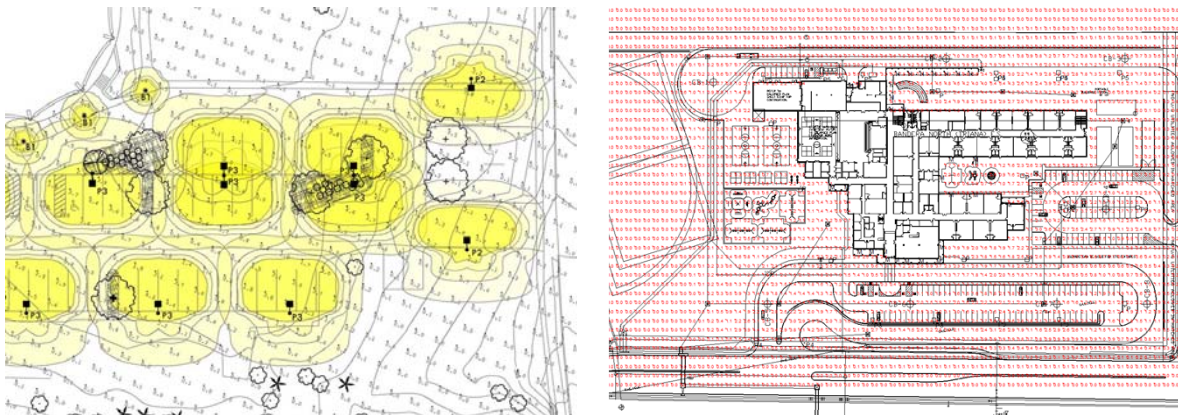
Visual Glossary – Foot Candle



Visual Glossary – Lumen



Visual Glossary – Photometric Plan



Current Zoning Lighting Standards						
Zone	RO – Residential Office	NC – Neighborhood Commercial	MU – Mixed Use	CR – Regional Commercial	O-R-D – Office, Research, and Development	PDD – Planned Development District
Objective	19.35.110 Lighting. A. Uniformity of lighting is desirable to achieve an overall design objective of continuity, and to avoid objectionable glare to adjacent residential areas .	19.37.110 Lighting. A. Uniformity of lighting is desirable to achieve an overall objective of continuity, and to avoid objectionable glare.	19.36.120 Lighting. A. Uniformity of lighting is desirable to achieve an overall objective of continuity and to avoid objectionable glare.	19.40.140 Lighting. A. Uniformity of lighting is desirable to achieve an overall objective of continuity, and to avoid objectionable glare.	19.46.110 Lighting. A. Uniformity of lighting is desirable to achieve an overall objective of continuity, and to avoid objectionable glare.	19.51.060.13. Lighting Standards. (c) Uniformity of lighting is desirable to achieve an overall objective of continuity, and to avoid objectionable glare.
Height of Luminaries	B. The maximum height of luminaries shall be 18 feet unless the planning commission requires a lower height as part of its approvals.	B. The maximum height of luminaries shall be 18 feet unless the planning commission requires a lower height as part of its approvals.	B. The maximum height of luminaries shall be 18 feet unless the planning commission requires a lower height as part of conditional use approval .	B. The maximum height of luminaries shall be 18 feet unless the planning commission requires a lower height as part of its approval .	B. The maximum height of luminaries shall be 18 feet unless the planning commission requires a lower height as part of its approvals.	(a) The maximum height of luminaries shall be based on the lighting plan approved by the PDZ ordinance .
Brightness	The light shall be low intensity, full cut-off , shielded from uses on adjoining lots, and directed away from adjacent property in a residential zone or an adjacent residential use.	The light shall be low intensity, shielded from uses on adjoining lots, and directed away from adjacent property in a residential zone or an adjacent residential use.	The light shall be low intensity, shielded from uses on adjoining lots, and directed away from adjacent property in a residential or agricultural zone or an adjacent residential or agricultural use .	The light shall be low intensity, shielded from uses on adjoining lots, and directed away from adjacent property in a residential zone or an adjacent residential use.	The light shall be low intensity, shielded from uses on adjoining lots, and directed away from adjacent property in a residential zone or an adjacent residential use.	The light shall be low intensity, shielded from uses on adjoining lots, and directed away from adjacent property in a residential zone or an adjacent residential use.
Walkways	C. Pedestrian walkways shall be lighted with bollards or lights at a maximum height of ten feet .	C. Pedestrian walkways shall be lighted.	C. Pedestrian walkways shall be lighted.	C. Pedestrian walkways shall be lighted.	D. Pedestrian walkways to mass transit facilities shall be lighted.	(d) Pedestrian walkways shall be lighted.
Fixture Type		D. All lighting next to residential uses, or where the planning commission requires, shall be full-cut-off lighting to reduce light pollution	D. All lighting next to residential zones, or where the planning commission requires, shall be directional; shall contain hoods or other measures to hide the light source; shall be no more than 15 feet in height to reduce light pollution and light spillage to the adjacent residential zone . The city may require a photometric study to be provided by the applicant demonstrating that such unacceptable light spillage to adjacent residential zones will not result, as determined by city staff.	D. All lighting next to residential uses, or where the planning commission requires, shall be full-cut-off lighting to reduce light pollution.	E. All lighting next to residential uses, or where the planning commission requires, shall be full-cut-off lighting to reduce light pollution.	
Photometric Study						
Curfew					C. All parking luminaries, except those required for security, shall be extinguished one hour after the end of business hours. The exception for security lighting applies to a maximum of 25% of the total luminaries used, unless the planning commission approves a higher percentage.	(b) All parking luminaries, except those required for security, shall be extinguished one hour after the end of business hours. An exception for security lighting will apply to a maximum of 25% of the total luminaries used, unless the PDZ ordinance specifies a higher percentage .