

Central West End Midtown Development

Pedestrian Lighting Study

Third Draft

609 EAST LOCKWOOD AVE.

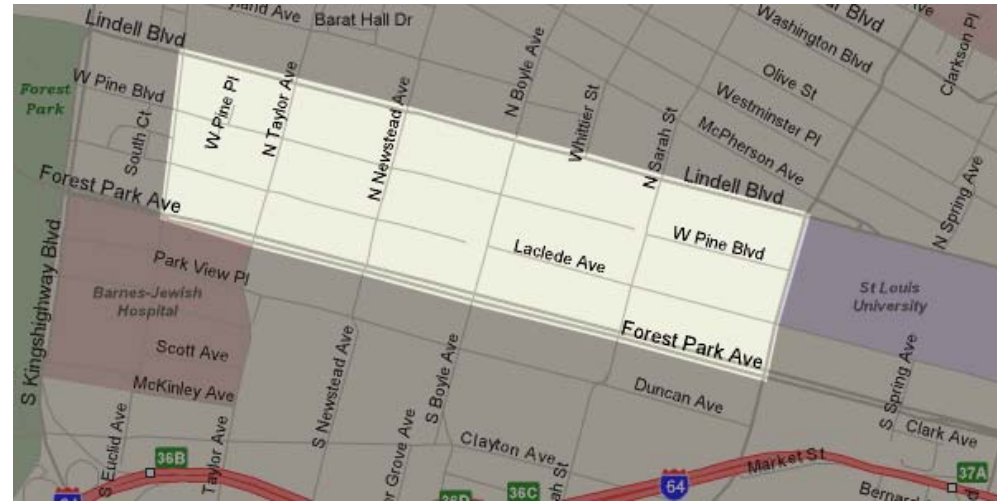
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Pathway Illumination – Basic Guidelines

Sidewalks are the primary transportation arteries for the Central West End's pedestrians. The pathways are illuminated by a variety of lighting elements, often indirectly, and can be at the mercy of available spill light from adjacent buildings, store-fronts and landscape. The principal contributors to pathway illumination are:

- Direct illumination from pole mounted cobra heads and decorative lighting.
- Direct illumination from building mounted area lights.
- Indirect illumination reflected from lighted building surfaces, plant materials and other elements.
- Direct spill light from storefronts and other lighted areas.

The general survey information in this report document sidewalk illuminance levels throughout the Central West End, as measured at 30 inches above the walkway surface. This measurement height provides a reasonable average of lighting levels at both grade and at pedestrian face height. These are good indicators of the quantitative lighting condition at a given location.

The Illuminating Engineering Society of North America (IESNA) has established consensus recommended design practice guidelines for outdoor pedestrian areas, which include illuminance levels (in foot-candles). These levels are as follows:

Pathways in heavy commercial activity zones	0.5 Foot-candles average
Pathways in light commercial activity and residential zones	0.2 Foot-candles average
Minimums in darker, low activity zones	0.1 Foot-candles
Uniformity of illumination (Maximum: minimum ratio)	10:1

These lighting levels are based on the ability of the human visual system to perform visual tasks at various states of adaptation. Fundamentally speaking, the eye requires more light in areas where the ambient lighting levels are higher (in commercial areas) than it does in lower ambient conditions (more remote tree lined pathway), for equivalent visual performance. Excessive contrast (glare) or poor uniformity can be counterproductive to good vision.



Sidewalk Illumination – Existing Conditions

Key Terms and Definitions

Color Rendering Index – An index rating from 0-100 (100 being the best) indicating a lamp source’s ability to accurately render color.

Cutoff Luminaire – A luminaire with minimal or no upward directed light.

Footcandle – A measurement of illuminance.

Glare – The sensation produced by brightness within a person’s visual field that is significantly greater than what the eye has adapted to, which causes annoyance, discomfort, or loss in visual performance and ability.

Illuminance - The quantity of light incident on a surface.

Light Pollution – Light that is directed upward to the sky or reflected from surfaces that interferes with the appreciation of the night sky.

Light Trespass – Unwanted light that falls beyond the property line or area intended to be illuminated.

Luminaire – A complete lighting unit consisting of lamps together with the parts designed to distribute the light, to position, and protect the lamp.

Luminance – For the context of this document luminance will refer to the sensation of brightness. This sensation is determined by both the surface brightness and the state of adaptation of the eye.

Reflector – A device used to redirect light from a source.

Refraction – The process by which the direction of a ray of light changes as it passes from one medium to another.

Refractor – A device used to redirect light from a source through the process of refraction.



Sidewalk Illumination – Existing Conditions

Not all pathway illuminance levels in the Central West End pedestrian areas technically meet these minimum illuminance recommendations. Over walkway systems of such length and diverse character, it is impractical to light every square foot of surface to meet these guidelines. It is more important, for the safety and security of visitors and other users of the pathways, that the recommendations be met in areas with inherently difficult visual conditions (pavement changes, obstructions, etc.) and in locations of potential hazards (stairs, elevation changes, narrow paths, etc.)

Given the diverse conditions that coexist within the areas covered by this study, it is also important that each street relate well to other zones in adjacency. Scale, brightness, and aesthetic relationships between neighborhoods or defined interest zones must be considered in order to achieve a successful lighting approach.

The design of independent pathway illumination levels must also take into account contributions from other independent public lighting systems. Most notably, in the Central West End, would be contributions to the pedestrian walkways from roadway lighting systems. The "cobra heads" typically found along many, but not all, streets will contribute, either positively or negatively to the objective goals and subjective impressions and, ultimately to the success of the design goals.

Existing Lighting Conditions

There are (4) four primary lighting conditions that exist within the bounded area of the study. Generally described they consist of:

Condition 1: Sidewalks illuminated by street lighting (cobra head only). Streets with this condition would include portions of Laclede Avenue and West Pine Boulevard.

Condition 2: Sidewalks illuminated by street lighting and decorative luminous acorns atop aggregate poles. Streets with this condition would include Lindell Boulevard and Sarah Street.

Condition 3: Sidewalks illuminated by street lighting and Victorian style "gas lights" with cutoff optics atop decorative poles. This occurs along portions of West Pine Boulevard.

Condition 4: Sidewalks illuminated by luminous globes atop simple poles. Streets with this condition include portions of Laclede Avenue and Newstead Avenue.

Condition 5: Sidewalks illuminated by a refractor covered by an acrylic acorn diffuser. This occurs on and around Euclid and McPheerson.

Illuminance Measurements

Illuminance (footcandle(FC)) measurements were taken after nightfall but during hours where normal, daily activity was still occurring. Measurements outlined include maximum and minimum footcandle readings found, extrapolated average, and uniformity ratios.

	<u>Condition #1</u>	<u>Condition #2</u>	<u>Condition #3</u>	<u>Condition #4</u>	<u>Condition #5</u>
Maximum FC	1.3 FC	2.5 FC	3.5 FC	1.8 FC	0.9 FC
Minimum FC	0.1 FC	1.4 FC	0.03 FC	0.2 FC	0.1 FC
Average FC	0.5 FC	2.1 FC	0.6 FC	0.9 FC	0.4 FC
Uniformity	13/1	1.8/1	117/1	9/1	9/1



Sidewalk Illumination – Existing Conditions

Objective Assessment

Generally speaking, none of the measured conditions meet the IES recommendations for illuminance or uniformity, with the exception of Lindell and Sarah Streets.

The lighting along Lindell, as related to objective measurement, provides a good balance of illuminance levels, uniformity and balance with the mixed residential and commercial establishments.

While there are many similarities between Lindell and Sarah, as related to equipment, the balance noted on Lindell is noticeably lacking on Sarah. There may have been a perceived need at one time to exceed recommendations, but, with the increased development of commercial establishments the lighting levels are too high, negatively impacting storefront visibility and creating unwanted glare conditions for nearby residences.

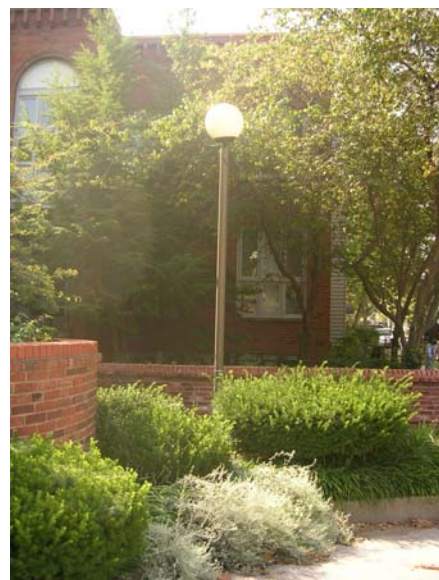
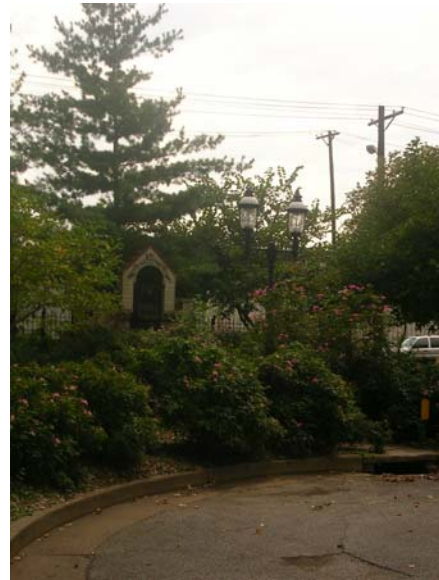
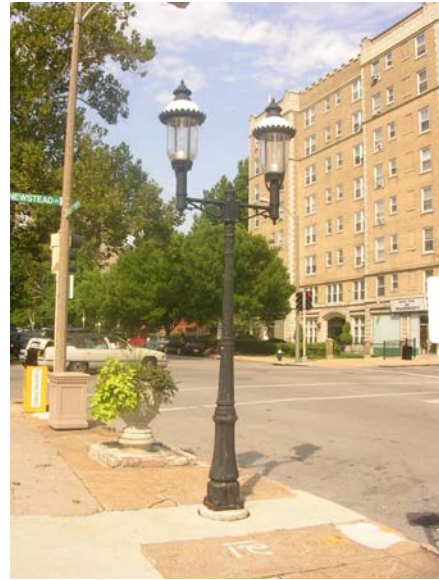
Other streets are well below IES recommendations. It is not uncommon for residential streets to be below recommendations. Brightness concerns, mature tree growth, and, to a lesser extent, cost concerns often impact overall performance. The degree to which the pedestrian lighting under performs is most concerning, especially when compared with over-performing streets. The contrast between the streets can be disconcerting and creates transition problems as one moves from one street to the next.

Another negative factor inherent in all neighborhoods is the lamp (light bulb) choice in all lighting equipment. High pressure sodium lamps (characterized by their orange cast) have several benefits associated with maintenance but their light quality diminishes visual performance, making identification of color and detail more difficult and reduces perceptions of brightness.

One last negative attribute to all pedestrian lighting systems, with the exception of portions of West Pine, is the luminous component of the body of the fixtures. In most cases, the light emitted from the globe tops or acorns creates both light trespass and pollution problems. It also creates visual performance problems. As one views the fixture, the pupil contracts, making adjacent areas feel darker.

The pedestrian lighting in northern sections of the Central West End, around the intersection of Euclid and McPherson was analyzed for comparisons sake as the installation is relatively recent.

Technically and objectively, the pedestrian lighting within this area meets IES recommendations. However, qualitatively, the luminous intensity of the globe creates significant glare, light trespass, and light pollution. Notably, visual performance for both pedestrians and drivers is negatively compromised. And the indiscriminate nature of the light distribution casts undesirable quantities of light onto residential units.



Pole Lighting – Existing Conditions (Daytime)

Subjective Assessment

Pole mounted lighting plays an influential role in the Central West End experience. During the daylight hours, light poles (for better or worse) are integral part of the visual aesthetic and overall ambience of the area. They occasionally serve as staging points for signage and graphics, while providing scale and orientation for pedestrians. Pole and luminaire styles are across the board, with their appropriateness to the specific applications often suspect.

In most cases pole lighting has an even greater impact on the nighttime scene. High pressure sodium is the most frequently used light source type.

The principal pole and luminaire attributes that are of greatest importance to the look and feel of the Central West End, both day and night, include:

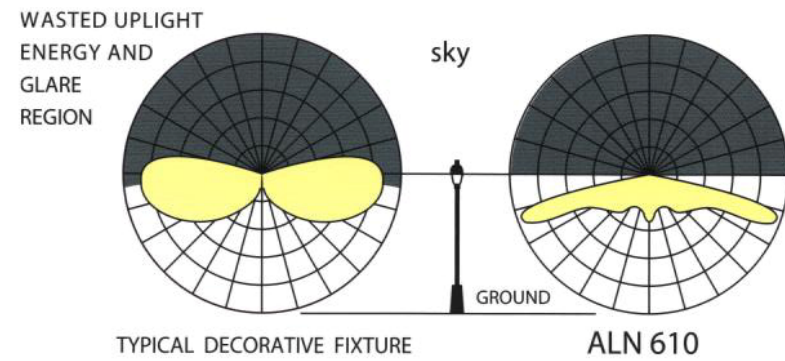
- Architectural and/or historic suitability to its surroundings.
- The visual appeal or aesthetic of the pole and luminaire design.
- Pole height and scale. Luminaire scale.
- Nighttime lighted contrast between the luminaire and its surroundings (i.e.-is it too bright?).
- Color appearance and color rendition of the light source.
- Visual contribution to functional and aesthetic illumination in the public area.
- State of operation.
- Maintainability and sustainability (including energy consumption).

Pole mounted lighting is an important aspect of the Central West End nighttime appeal and functional success. Pathway illumination is the most often acknowledged role for lighting poles, but they also can enrich the visual experience, help provide a sense of place, and reinforce the architectural style of the surrounding buildings and structures.

Many of the lighting poles along the sidewalks occur in the public realm and are under the City's control. Most are well maintained and operational. They are not all, however, equally as effective or appropriate to their roles. Some of the issues that could be addressed include:

- Better glare and spill light control from unshielded, non-cutoff area light styles.
- Improvement in stylistic compatibility with the area or surrounding architecture.
- Lesser dependence on high pressure sodium sources, and more on low wattage metal halide, or other white light sources.
- Greater standardization on lamp styles and wattages.
- Improvement in the uniformity of the lighted pathways.
- Improvement in brightness relationships from street - to - street.

LIGHT POLLUTION REDUCTION



Pole Mounted - Improvements

The diverse collection of existing light pole types and luminaire styles represent equally variable condition of light quality. Some luminaires are too bright, or ineffective at delivering useful functional illumination. Some are appropriately scaled, while others have historic context. There are a few poles that are simply inappropriate and should be removed and replaced.

One rational approach for developing expanded pole lighting systems would involve the establishment of a palette of Central West End light poles that could be used, where needed, to provide additional ambient and aesthetic enhancing light. Pole and luminaire selections would be identified for different neighborhoods to better embrace the inherent nature of the localized surroundings, including architecture. Common to all pole mounted luminaires would be light source (preferably low wattage metal halide), cutoff optics or indirect source illumination, and overall control of spill light. These systems would consist of off-the-shelf components to facilitate ease of maintenance. Poles and lighting fixtures could be stored, and then installed on an as needed basis.

Lighting from poles plays an important role in the Central West End's functional and aesthetic success. The selected fixtures should address issues of glare, light pollution, and light trespass. As demonstrated in the adjacent photograph, improved light control provides improved visibility. Fixtures should be selected that allow for feelings of safety and security but should not create unwarranted light trespass conditions.



Pole and Bollard Lighting Improvements



Existing Conditions – Euclid & McPherson

Refractor Luminaires



Benefits – Greater ability for a wide distribution of light.

Deficits – Luminaire brightness can be a problem, especially with less expensive manufacturers with acrylic or polycarbonate refractors and diffusers.



Luminous Globe



Benefits – Inexpensive.

Deficits – No glare control, no formal distribution pattern.

