Sources:

Carmen, J & Fox, E. (2009). Outdoor Environments Supportive of Independence and Aging Well. In P. S. Abbott, N. Carman, J. Carman, B. Scarfo (Eds.), *Re-creating Neighborhoods for Successful Aging: Edition 1* (pp. 163-210). Baltimore: MD, Health Professions Press.

Donoff, E. (2007). Choosing a lighting designer. *Architectural Lighting*, 21(1), 55-57.

Gilmour, B., Geraghty, S., Morton, K. (2011). *Municipal Policy Options Guide for Advanced Outdoor Lighting*. Toronto, CAN: Canadian Urban Institute.

The Institution of Lighting Engineers. (2005). *The Outdoor Lighting Guide*. Abingdon, Oxon: Taylor & Francis.

Khan, Ata M,PhD, PEng, & Kline, D., PhD. (2011). Addressing older driver visibility needs in roadway lighting design. *Institute of Transportation Engineers*. ITE Journal, 81(3), 20-22, 24, 29.

Mitchell, L., Burton, E. and Raman, S. (2004). *Neighbourhoods for life: A checklist of recommendations for designing dementia-friendly outdoor environments.* Oxford, UK: Oxford Centre for Sustainable Development and the Housing Corporation.

Painter, K. (1996). The influence of street lighting improvements on crime, fear and pedestrian street use, after dark. *Landscape and Urban Planning*, 35(2–3), 193-201. doi: http://dx.doi.org.proxy1.lib.umanitoba.ca/10.1016/0169-2046(96)00311-8

Quality of the Visual Environment Committee, Illuminating Engineering Society of North America. (2008). *Light + Design: A guide to designing quality lighting for people and buildings.* New York, NY: Illuminating Engineering Society of North America.

Lighting

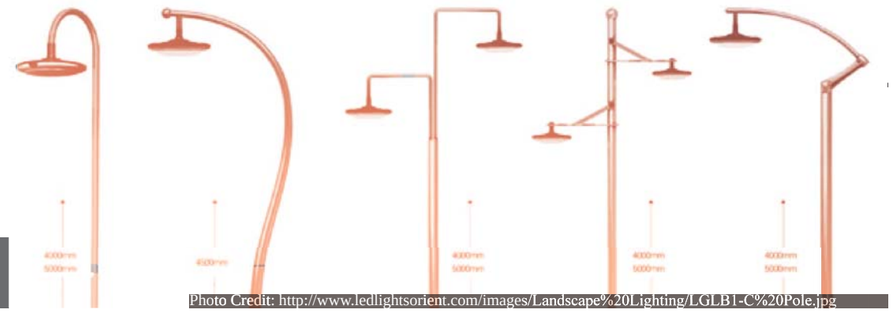


Photo Credit: http://www.ledlightsorient.com/images/Landscape%20Lighting/LGLB1-C%20Pole.jpg

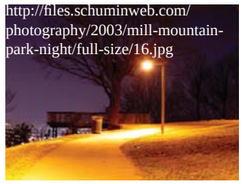
Ryan Litovitch

In its fundamental role, town or city street lighting is essential for basic night-time municipal visibility. Wherever people may need to transport themselves, either through walking, cycling or in an automobile during night-time conditions, especially in public space, chances are that to some extent lighting will be required and its placement possibly dictated by local policy. In addition to addressing basic visibility concerns for evening and night-time conditions in a town or city, the implementation of municipal street lighting in either new districts or already established ones may involve considerations as complex as safety, crime prevention, visibility for older people, wayfinding, municipal character and design, and light pollution and glare. Different techniques and lighting technologies can be utilized in ways to meet these more complex considerations. An understanding of the basic concepts of municipal lighting design and standards will inform decision making for different townscape requirements and interests. This document will provide discussion on these general yet important concepts through mentioning of case studies and established guides on town and city lighting.

Safety & Visibility

Safety and crime concerns may be addressed by municipal lighting. Observations made by Painter (1996) showed that good quality street lighting contributed to a sense of safety for residents in certain boroughs of London, UK. In addition, street-light improvements in vehicular parking areas reduced actual car theft in one these regions (Painter, 1996, p. 195). The latter benefit may not necessarily transfer to all towns and cities of different scales and characteristics, however perceived personal safety through adequate lighting is an important aspect when looking to improve the pedestrian experience in a town or city.

“Older people require between two to five times more lighting than younger adults.”



http://files.schuminweb.com/photography/2003/mill-mountain-park-night/full-size/16.jpg

fig. 1: Well-lit pedestrian space.

Night-time visibility (fig.1), especially for older people who drive vehicles, is another important consideration where decisions around street lighting are taking place. The work of Khan and Kline (2011, p. 24) states that older people typically have more instances of visual disorders and reduced visual acuity, especially in a reduction of sensitivity to light contrast. Mitchell, Burton & Raman (2004) support these common difficulties of older people by stating, “Older people require between two to five times more lighting than younger

http://macalawright.com/wp-content/uploads/2013/06/SF-ROAD-LIGHTING.jpg

fig. 2 : Insufficient road lighting for older people.

http://www.westberks.gov.uk/media/image/j/j/_T1C2436-low-res_1.jpg

fig. 3 : Good road lighting for older people.

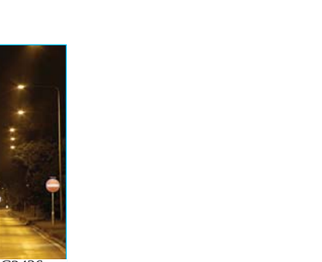
adults. They also struggle to cope with deep shadow, bright light and glare" (p. 7). In "Addressing Older Driver Visibility Needs in Roadway Lighting Design", Khan and Kline provide an informative overview of newer research and methodologies framing the decision making around roadway lighting that supports older peoples' needs, one of these being small-target visibility or STV (2011, p. 21). Increasing contrast through street lighting and enhancing visibility around roadways(fig. 2, 3) are possible strategies suggested by Khan and Kline in order to benefit older drivers (2011, p. 24).

...glare from street lights and the equivalent reduce visibility.

Since street lighting in towns and cities can be utilized to promote spatial visibility, then it seems relevant to connect this to the concept of 'wayfinding'. According to Carmen & Fox (2009, p. 186), "The ability of people to navigate those destinations in a secure and comfortable manner is wayfinding." Lighting can perhaps make an important contribution in helping people of any age to navigate through space toward chosen destinations.

Design Necessities

When it comes to the question of how lighting should be implemented either in a newly developed part of a town or city or for existing areas and streets, aesthetic characteristics and overall quality of the space may require consideration. A municipality may choose to consult with a professional such as a lighting designer to ensure established goals are achieved. In "Choosing a Lighting Designer", Donoff (2007) provides general information on how the consultation process may proceed, which may demystify for some the role of this type of professional.

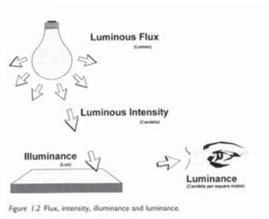


Institute of Lighting Engineers

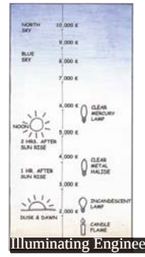
fig. 4: Light Pollution Concepts

The downside of implementing a street lighting strategy without careful design consideration is the threat of light-pollution (fig. 4) and glare. The Institution of Lighting Engineers (2005) state that obtrusive light "…is not only a nuisance, it wastes electricity and thereby large sums of money…" (p. 16). This is in addition to being a physiological problem to humans (Institution of Lighting Engineers, 2005). Glaring lights also present an issue in that glare effects older people negatively (Khan & Kline, 2011), being referred to as disability glare (Illuminating Engineering Society of North America, 2008). Therefore, glare from street lights and the equivalent reduce visibility (p. 70).

fig. 5: Luminance



Institute of Lighting Engineers (2005, p. 3)



Illuminating Engineering Society (2008, p.41)

fig. 6: Colour Temperatures

Professional consultation may also help reduce or eliminate light-pollution

Concepts

There are a few definitions that are important to know (Institute of Lighting Engineers, 2005):

Flux: total quantity of light emitted from a source (fig. 5)
Luminance: amount of light reaching the eye through reflection off a surface
Colour Rendering: ability of light to render surface colours correctly (fig. 6)

Techniques and Technologies

"The Outdoor Lighting Guide" by The Institution of Lighting Engineers (2005) serves as an informative guide to lighting concepts, planning, strategies, standards and appropriate technologies for different uses. For example, it suggests lamp technologies such as high pressure sodium and metal halide for major roadways for sufficient illumination but introduces a compact fluorescent recommendation for residential areas because better colour rendering is required in that context. Luminaire recommendations are also included along with mounting heights. For newer Light Emitting Diode (LED) technologies (fig. 7), Gilmour, Geraghty & Morton (2011) provide a comprehensive overview of municipal case studies where LED lighting technology has been implemented, including summaries of cost-benefit analysis performed.

fig. 7: LED street lamp

http://www.highbay-ledlights.com/photo/pl620122-professional_110v_130v_250v_48w_168w_bridgelux_ip67_led_road_lamp_led_street_light.jpg

Final Thoughts

For new and already existing streets within towns and cities, night-time conditions pose many challenges and opportunities. Concerns of safety and visibility and what these mean for older people deserve well-thought out solutions. Lighting may contribute to how-well individuals' are able to navigate to the places they want to or need to go. Character and aesthetic factors are also very much an important aspect of street lighting and may require professional planning and design to maintain the integrity of a municipalities end-goals. Professional consultation may also help reduce or eliminate light-pollution and glare that may otherwise work its way in through insufficiently considered plans. The complexity of street lighting possibilities shows through the many technologies that may be utilized for specific purposes and reinforces the necessity for good planning and design for an important project such as lighting.