Outdoor Lighting Ordinances:
Proven Alternatives to the "M.L.O."

A reprint of the Illinois Coalition for Responsible Outdoor Lighting website page at http://www.illinoislighting.org/propose2.html

Our organization is firmly committed to the idea that our society needs to be made aware of the substantial problems caused by current outdoor lighting practices, and that when these issues are better understood, and improved methods are demonstrated, many problems will decrease through voluntary adoption of the improved practices. However, as with many issues where the practices of one party have widespread effects on neighboring parties, or on the communal environments (both natural and man-made), there is also ultimately a need for legal regulation of outdoor lighting. Over the past quarter century, a number of approaches toward regulating lighting on the municipal, county, and state levels have been created, including the recently released IDA/IES Model Lighting Ordinance (the "MLO"). Our attempt here is to provide some insight into the present state of lighting ordinances, especially for people who may be investigating the creation of one for their municipality, and to offer some proven alternatives to the new MLO, which many people from the light pollution abatement community consider to be lacking in practicality and effectiveness.

Municipalities benefit by regulating lighting installations, preventing unsafe neighborhood-filling glare (above) by specifying more effective lighting practices (below).

The concerns addressed in existing regulation of outdoor lighting practice have varied from location to location. For instance, some regulation has focused more on environmental impact of stray light, and other more on energy consumption. Our intent with this article in the future is to expand our analysis, with more in depth discussion of various lighting parameters we outline on our Our Proposals > Regulations[1] page,

comparing the on-the-ground effectiveness of different approaches to regulation. But as a beginning, we'll look at an overview of the state of the art of outdoor lighting regulation.

The Pattern Code

One of the best general summaries of the concepts and implementation of municipal lighting regulation is the ***Outdoor Lighting Code Handbook*** published by the International Dark-sky Association in 2000 and revised in 2002 (available Here[2] in PDF format and Here[3] in interactive HTML). Contained within the Handbook is the "USA Pattern Code", which offers a template of a municipal lighting code, based on the principles laid out in the Handbook.

The USA Pattern Code has served as the template for lighting ordinances which are successfully being implemented in a number of locations, including Flagstaff, AZ[4], Coconino County, AZ[5], Yavapai County, AZ[6], Homer Glen, IL[7], Madison, MS[8], and Wales, WI[9].

A central feature of Pattern Code is limitation of the total amount of light generation permitted, determined by the ground area to be developed: lumens-per-acre caps. (Lumens are a measure of light output as seen by the human eye, and can be found on every lamp package and catalog description. Lumens-per-acre is a simple calculation that does not require specialized technical training.) The general lumens-per-acre and lighting zone concepts as applied in the Pattern Code are devised with the specific purpose of restoring and protecting dark skies, particularly in and near the zones with tighter lighting restrictions, and not (as implemented in the IDA/IES MLO) based upon the amounts of lighting already used in an area and/or amounts recommended by the lighting industry.

The Pattern Code lumen allowances are, however, compatible with quality lighting design, and accommodate basic lighting needs (such as safety, utility, security, and commerce) in amounts recognized by the lighting industry (IES Recommended Practices). The allowances are general and not use-specific, providing maximum flexibility to the lighting designer to address the client's needs and priorities within an overall "lumen budget." Professional quality designs can achieve the goals and solve the problems, if any, of each lighting situation by trading off amounts of decorative and general illumination, areas to be illuminated, illumination levels and uniformities, luminaire optical design, and other factors. In primarily residential or rural areas, the lumens-per-acre allowances specified within the Pattern Code are expected to provide some restrictions for less essential uses such as ornamental lighting, though the purpose is to effectively limit light pollution and conserve energy, not to disallow non-essential uses.

The Pattern Code of 2002 is no longer state-of-the-art, because of new technologies, and current research into environmental impacts; it has been updated in the ***Pattern Outdoor Lighting Code*** (2010) by Christian Luginbuhl of the U.S. Naval Observatory, editor and principal author of the *Outdoor Lighting Code Handbook*. The *Pattern Outdoor Lighting Code* (available Here[10]) incorporates over two decades of

demonstrated, real-world application of lighting regulation, shown to be effective in controlling manmade skyglow, and stands as the best current framework for developing municipal regulation for dark sky preservation.

The MLO

About ten years ago, the International Dark-sky Association (IDA) began exploring the idea of developing a framework, general purpose lighting ordinance which would meet the approval of the lighting design and manufacturing industries. In 2005, the IDA signed an agreement with the Illuminating Engineering Society (IES), an American industry trade group, to form a task force to draft a new "Model Lighting Ordinance". In June of 2011, the boards of both the IES and the IDA approved the adoption of the "*Joint IDA-IES Model Lighting Ordinance*".

Our organization finds no significant benefits in the *Model Lighting Ordinance* (MLO), in comparison with the *Pattern Outdoor Lighting Code*. Indeed, by our analysis, in some aspects, lighting allowances within the MLO are "worse" than what we find in common, unregulated practice; in many ways, they certainly do not come near to the "best practices" available with current technology. The MLO takes the "lighting zone" concept, which was created in earlier local regulations to recognize the special needs for dark-sky preservation around astronomical observatories, and turns it on its head. Instead of saying "adequate lighting everywhere it is needed, but extra darkness around special areas", the MLO's zone system encourages more than adequate lighting in populated areas, and higher levels yet in cities. (We stand by the concept that lighting practices and light levels adequate for safe and productive activity in one area will also suffice in another area; we also decry the suggestion that future lighting practices should be based on present ones, which have simply gotten out of hand in many areas; read Here[11] for more consideration of these ideas.) The baffling complexity of the regulations contained in the MLO both would require most municipalities to bring in lighting specialists to administer the ordinance, and also serves to hide the arbitrary nature of some of the numerical limits that the document imposes. And the lumen allowances -- the limits to the total amount of light which can be generated by outdoor fixtures on a parcel of land -- are so flexible that there is no indication that they represent any change from common, unregulated practice.

Summary

Any lighting regulation ultimately deals with complex issues of human visual response, and visual acuity related to a variety of tasks at lower light levels. We suffer from a shortage of good, scientific research into this type of visual response in the sort of real-world situations which we're applying light to at night. Many attempts to regulate lighting refer to specific light levels which have been speculated to be needed to perform various tasks; speculation which, unfortunately, sometimes lacks a good scientific foundation, and often does not take into account visual response to variables such as light spectral qualities[12], or response to glare or intrusive light. Specification of particular illumination levels can also have the undesirable effect of *requiring* lighting where it isn't needed; for example, if a business has a parking area which is never used at night, but

the local ordinance lists a minimum illumination level for parking areas, the business will have to light that lot.

Instead of beginning by requiring specific illumination levels (based on questionable illumination recommendations), it is possible to structure practical and effective lighting regulation from a top-down approach, addressing standards for items such as luminaire performance and total lighting allowances. Luminaires can be required to keep their output within target areas ("shielding"); lumens per area limits can keep the total amount of light generated within a range which the community finds acceptable, while still allowing flexibility in lighting design.

Imbedded Web links:

1. http://www.illinoislighting.org/propose.html
2. http://data.nextrionet.com/site/idsa/Lighting%20Code%20Handbook.pdf
3. http://www.nofs.navy.mil/about_NOFS/staff/cbl/OLCHB1.14/lc-hb-v1-14.html
4. http://www.flagstaffdarkskies.org/docs/9_%20Title10%20Chapter8%20-%20Signs%20and%20Lighting.PDF
5. http://www.coconino.az.gov/uploadedFiles/Community_Development/Section17.pdf
6. http://www.flagstaffdarkskies.org/docs/YavapaiLC.pdf
7. http://homerglen.org/Ordinances/OR07-068Lighting-Outdoor.pdf
8. http://www.madisonthecity.com/communitydevelopment/documents/FINALExteriorLightingOrdinancerev12-01-08.pdf
9. http://www.vi.wales.wi.gov/docview.asp?docid=1906&locid=174
10. http://www.nofs.navy.mil/about_NOFS/staff/cbl/CL_POLC_standard_v2.0.pdf
11. http://www.illinoislighting.org/parceling.html
12. http://www.illinoislighting.org/lightcolor.html