

memorandum

DATE: December 6, 2021
TO: Rochester Hills Planning Commission
FROM: Jill Bahm & Joe Tangari, Giffels Webster
SUBJECT: Zoning Issue Discussion – Lighting

Introduction

The City of Rochester Hills has been facing a variety of situations that reflect a need to update the city's lighting regulations in order to diminish the external effects of site lighting throughout the city. Concerns from staff, the Planning Commission and community have included:

- Brightness and color associated with LED light fixtures
- Number/height of fixtures/overall impact: Should poles with two fixtures be considered as separate fixtures or combined wattage? How to measure height - pole height should include the concrete base (overall height from the ground to the top of the fixture)? Are fewer but higher poles better than more but shorter poles?
- Edison bulbs and other exposed lights are becoming more popular; should they be regulated more specifically?
- Although not in the zoning ordinance, should sign illumination be addressed or cross-referenced to the lighting section?
- Over the past few years, there seem to be some developments with sites that are too bright.
- Should the City focus more on "dark sky" language to better address light pollution?

Additional consideration should be given to when existing sites should be brought up to current ordinance standards with respect to lighting.

Current Ordinance

The ordinance addresses lighting in Article 10, Chapter 2. The purpose of regulating lighting is provided in Section 138-10.200:

"The purpose of this Chapter is to preserve, protect, and enhance the lawful nighttime use and enjoyment of all properties in the City through the use of appropriate lighting practices and systems. Exterior lighting shall be designed, installed and maintained to control glare and light trespass, minimize obtrusive light, conserve energy and resources, maintain safety, security and productivity, and prevent the degradation of the nighttime visual environment. It is the further intent of this Chapter to encourage the use of innovative lighting designs and decorative light fixtures that enhance the character of the community while preserving the nighttime visual environment."

Potential impacts and considerations

The concerns outlined above can be addressed with a variety of amendments.

- **Brightness and color associated with LED light fixtures.**

Brightness can be addressed by regulating overall light levels on a site, which is highly controllable with modern lighting technology. Color complaints can be addressed by regulating the correlated color temperature of all lighting.



- **Number/height of fixtures/overall impact.**

When we consider the height and number of fixtures, one thing to keep in mind is that many lighting-based complaints are based on over-brightness of sites near residential development, and glare from commercial fixtures. In general, the higher a fixture is mounted, even when shielded, the more likely its light-emitting element will be visible from off-site. Where the goal is to reduce the off-site effects of lighting that ultimately generate complaints, lower mounting heights, in conjunction with overall illuminance levels, are more likely to reduce overall problems with light trespass.

- **Edison bulbs and other exposed lights are becoming more popular.**

Edison bulbs generally have a light output of 25-400 lumens and have a very low impact. However, screening from residential uses is still necessary when they are used outdoors. These bulbs have been defined and addressed in the draft.

- **Sign illumination.**

A simple cross reference is adequate to ensure that users of the ordinance are properly directed to the sign ordinance. Illumination of signs is most appropriately addressed in the sign regulations.

- **Dark Sky regulations.**

Though it takes steps to create a less light-intensive environment, this draft is not a full dark sky ordinance. The city could consider adopting a dark sky policy, which would entail a more intensive set of regulations, such as governing the light reflectance value of the ground cover below lighting fixtures, regulating clutter (excessive grouping of light sources that create a bright and confusing environment), and governing overall light on a site via an illuminance budget.

- **Measurement of lighting.**

Proposed lighting is analyzed for compliance via the photometric plan and lighting cut sheets required with the site plan. Once a project is constructed, compliance can be measured with a light meter.

Recommendation

Proposed amendments follow.

Section 138-13.151 Definitions

LIGHTING. The following definitions are related to lighting:

- A. Canopy. Any overhead protective structure which is constructed in such a manner as to allow pedestrians/vehicles to pass under.
- B. Edison bulb. An incandescent light bulb with an exposed filament or an LED bulb simulating the appearance of such a bulb, meant to provide atmospheric lighting and producing a light output not greater than 400 lumens.
- C. Floodlight. Any light fixture or lamp that incorporates a reflector or refractor to concentrate the light output into a directed beam in a particular direction.
- D. Footcandle. A unit of illuminance, which is the quantity of light, or luminous flux, arriving at a surface divided by the area of the illuminated surface, amounting to one lumen per square foot.
- E. Fully Shielded Fixture. A luminaire constructed or shielded in such a manner that all light emitted by the luminaire, either directly from the lamp or indirectly from the luminaire, is projected below the horizontal plane through the luminaire's lowest light emitting part as determined by photometric test or certified by the manufacturer.
- F. Glare. Direct light emitted by a luminaire that causes reduced vision or momentary blindness.
- G. Light Fixture. The assembly that holds a lamp and may include an assembly housing, a mounting bracket or pole socket, a lamp holder, a ballast, a reflector or mirror, and a refractor or lens. A light fixture also includes the assembly for luminous tube and fluorescent lighting.
- H. Light Pollution. Artificial light which causes a detrimental effect on the environment, enjoyment of the night sky or causes undesirable glare or unnecessary illumination of adjacent properties.
- I. Light Trespass. The shining of light produced by a luminaire beyond the boundaries of property in which it is located.
- J. Lumen – As used in the context of this Ordinance, the light-output rating of a lamp (light bulb).
- K. Luminaire. The complete lighting system including the lamp and light fixture.
- L. Luminaire Cut-Off Angle. The angle, measured up from the nadir, between the vertical axis and the first line of sight at which the bare source is not visible.
- M. Luminous Tube Lighting. Gas filled tubing which, when subjected to high voltage, becomes luminescent in a color characteristic of the particular gas used, e.g. neon, argon, etc.
- N. Outdoor Light Fixtures. Outdoor artificial illuminating devices, installed or portable, used for floodlighting, general illumination, or advertisement.
- O. Strip Lighting. A device or devices installed that attract attention to a non-residential use wherein a source or sources of light are arranged to be visible from the exterior of a building or structure including, but not limited to, strips of LED lights or neon tubes placed along the perimeter of building windows, along building edges, and other locations that serve to attract attention to a non-residential use. This definition shall not include any device or devices classified as a sign by the definitions and regulations in the Zoning Ordinance. Temporary lights otherwise regulated by this ordinance are also excluded from this definition.

CHAPTER 2. - EXTERIOR LIGHTING

SECTION 138-10.200 - Purpose

The purpose of this Chapter is to preserve, protect, and enhance the lawful nighttime use and enjoyment of all properties in the City through the use of appropriate lighting practices and systems. Exterior lighting shall be designed, installed and maintained to control glare and light trespass, minimize obtrusive light, conserve energy and resources, maintain safety, security and productivity, and prevent the degradation of the nighttime visual environment. It is the further intent of this Chapter to encourage the use of innovative lighting designs and decorative light fixtures that enhance the character of the community ~~while preserving the nighttime visual environment.~~

SECTION 138-10.201 Applicability

- A. Existing Buildings and Uses. Any new outdoor lighting installed on a building or parcel shall meet the requirements of this chapter with regard to shielding and lamp type.
- B. Site Plans. Whenever a site plan is required, the applicant shall submit a complete inventory and photometric plan detailing all existing and any proposed new or modified outdoor lighting. If no changes to lighting are proposed, the photometric plan and inventory are not required.
 - 1. Where a site plan proposes a new use, a new building, or an addition or change of use leading to an increase of 50 percent or more in terms of additional dwelling units, total gross ground floor area of an entire building, indoor seating capacity, or parking spaces, all outdoor lighting on the site shall be brought into compliance with this Chapter.
 - 2. Where a site plan proposes to increase the number of dwelling units, total gross ground floor area of an entire building, indoor seating capacity, or parking spaces by less than 50 percent, only new or modified outdoor lighting is required to be compliant with this chapter.
- C. All outdoor light fixtures on property or buildings that are owned and operated by the City of Rochester Hills shall be fully shielded.

SECTION 138-10.201 - General Provisions

The design and illumination standards of this Chapter shall apply to all exterior lighting sources and other light sources visible from the public right-of-way, road easement, or adjacent parcels, except where specifically exempted herein.

- A. **Shielding.** Exterior lighting shall be fully shielded and directed downward at a 90-degree angle. Oblique lenses (such as many wall-pack fixtures) are prohibited. All fixtures shall incorporate full cutoff housings, louvers, glare shields, optics, reflectors or other measures to prevent off-site glare and minimize light pollution. Only flat lenses are permitted on light fixtures; sag or protruding lenses are prohibited.
- B. **Intensity.** ~~The following light intensity requirements shall apply on all sites within the City.~~
 - 1. ~~The intensity of light within a site shall not exceed ten footcandles. Exception: the maximum intensity permitted in areas of intensive vehicular use, such as the area underneath gas station pump canopies, in the immediate vicinity of ATM facilities, or outdoor sales areas shall be 20 footcandles.~~
 - 2. ~~The maximum light intensity permitted at a street right of way line shall be one footcandle.~~
 - 3. ~~The maximum light intensity permitted at any property line other than a street right of way shall be 0.5 footcandles.~~
- B. **Glare.** Exterior lighting sources in all districts shall be designed, constructed, located and maintained in a manner that does not cause off-site glare on neighboring properties or street rights-of-way. ~~In general~~ Except as otherwise permitted, the hot spot, or light emitting element of any light fixture shall not be directly visible from a neighboring property, as this is the primary cause of glare. The light emitting element of any light fixture that exceeds 400 lumens shall be fully shielded.

C. **Light trespass.** Light levels shall not exceed 0.1 footcandles at the property line where the site abuts a public right-of way or a lot with a residential use or zoning. Where the site abuts a non-residential use, light levels at the property line shall not exceed 0.3 footcandles.

D. **Lamps.** All fixtures shall comply with Illuminating Engineering Society of North America standards.

- ~~1. **Wattage.** Lamps with a maximum wattage of 250 watts per fixture are permitted for use in the City to maintain a unified lighting standard and to minimize light pollution. The Planning Commission may permit the use of lamps with wattages up to 400 watts if the applicant can demonstrate that the higher wattage fixture is necessary to provide adequate lighting on the site and that the light fixture is in compliance with all other requirements of this Chapter. The exemption for higher wattage lamps shall not be granted if the same lighting effect can be reasonably accomplished on the site by incorporating additional 250 watt fixtures into the site design.~~
- ~~2. **Low traffic areas.** Low pressure sodium lamps are recommended for security lighting purposes in areas of low vehicular and pedestrian traffic.~~
- ~~3. **High traffic areas.** Due to their superior color rendering characteristics, high pressure sodium or metal halide lamps should be used in parking lots and other areas of high pedestrian and vehicular traffic use.~~
- ~~4. **LED Lighting.** LED fixtures may be used for any outdoor lighting application. Any LED fixture used for parking lot or street lighting purposes shall comply with applicable Illuminating Engineering Society of North America standards.~~

E. **Required illumination.** Lighting should be even throughout and shall not exceed an average illumination to minimum illumination ratio of 4:1. Specific areas on a site shall be illuminated in accordance with the following table:

| Site/Building Feature | Minimum Footcandles | Maximum Footcandles |
|---|---------------------|---------------------|
| Pedestrian areas / sidewalks | 0.2 | 1.0 |
| Building entrances | 1.0 | 5.0 |
| Driveway lighting | 0.2 | 1.0 |
| Parking areas | 0.2 | 2.0 |
| Parking areas or maneuvering lanes within 25 feet of the building | 2.0 | 4.0 |
| Under gas station canopies, outdoor sales areas, immediate vicinity of an ATM | 2.0 | 20 |

F. ~~**Animated lighting.** Permanent exterior lighting shall not be of a flashing, moving, animated, or intermittent type.~~

G. **Hours of operation.** All exterior lighting in nonresidential districts shall incorporate automatic timers and shall be turned off between the hours of midnight and sunrise, except for lighting necessary for security purposes or accessory to a use that continues after midnight. Security lighting shall, to the extent practical, use sensors and dim or turn off when there is no activity on site.

H. **Measurement.** Light intensity shall be measured in footcandles on the horizontal plane at grade level within the site, and on the vertical plane at the property or street-right-of-way boundaries of the site at a height of five feet above grade level.

- I. Lighting Height. Fixture height shall be measured from the grade of the illuminated surface directly below the fixture to the bottom of the fixture.
- J. LED light sources shall have a correlated color temperature that does not exceed 3000K.

SECTION 138-10.202 - Standards by Type of Fixture

- A. **Freestanding pole and building mounted lighting.** The maximum height of such fixtures is 20 feet. Where a pole-mounted fixture is located in a residential district or within 50 feet of a residentially zoned or used property, the maximum pole height shall be 15 feet.
- B. **Decorative light fixtures.** The Planning Commission may approve decorative light fixtures as an alternative to shielded fixtures, provided that such fixtures would enhance the aesthetics of the site and would not cause off-site glare or light pollution. Such fixtures ~~may utilize incandescent, tungsten-halogen, metal halide or high-pressure sodium lamps with~~ shall not exceed a maximum ~~wattage of one-hundred watts (100w) per fixture~~ of 400 lumens.
- C. **Edison bulbs.** Edison bulbs, as defined in this ordinance, may be used outdoors individually or on strings to provide atmospheric lighting for outdoor dining areas, gathering spaces, alleys, and other similar spaces. Such lighting shall be turned off outside of business hours and screened from abutting residential properties.
- D. **Architectural lighting.** Where lighting illuminates features on an above grade or vertical target, including but not limited to architectural features, signs, landscaping, fountains, and sculptures, luminaires shall be partially shielded and shall be installed and aimed to minimize their output past the object being illuminated, skyward or otherwise. Such lighting shall not cause light trespass as specified in this section, or glare.
- E. **Signs.** Signs shall be lit in accordance with the standards of Chapter 134 Signs of the Rochester Hills Code of Ordinances.
- F. **Indoor lighting.** Indoor lighting shall comply with Section 138-204 and shall not be a source of glare or light trespass as regulated in Sections 138-10.201.C and 138-10.201.D above. Indoor lights visible from outdoors shall not flash.

SECTION 138-10.203 - Exempt Lighting

The following exterior lighting types are exempt from the requirements of this Article, except that the Building Director may take steps to minimize glare, light trespass or light pollution impacts where determined to be necessary to protect the health, safety and welfare of the public:

- A. Holiday decorations.
- B. Pedestrian walkway lighting.
- C. Residential lighting.
- D. Instances where federal or state laws, rules or regulations take precedence over the provisions of this Chapter.
- E. Temporary emergency lighting.
- F. Public Rights-of-Way Exempt. The provisions of this division shall not apply to streetlights installed in public rights-of-way.

Section 138-10.204 - Prohibited Lighting

The following types of outdoor lighting are specifically prohibited:

- A. Lighting that could be confused for a traffic control device.

- B. Lighting that is oriented upward, except as otherwise provided for in this ordinance.
- C. Searchlights, beacons, and laser source light fixtures.
- D. Lights that blink, flash, move, revolve, flicker, change intensity, or change color.
- E. Strip Lighting.
- F. Any lamp or bulb when not within a luminaire and which is visible from the property boundary line of the parcel on which it is located, except for landscape ornamental lighting; and lighting inside of an awning when the awning becomes illuminated.

SECTION 138-10.205 - Exceptions

It is recognized by the City that there are certain uses or circumstances not otherwise addressed in this Chapter, such as sports stadiums, streetlighting, or lighting for monuments and flags, that may have special exterior lighting requirements. The Planning Commission or the Planning and Economic Development Director may waive or modify specific provisions of this Chapter for a particular use or circumstance upon determining that all of the following conditions have been satisfied. The Planning Commission shall be the deciding body in all cases where site plan or special use approval is required, while the Planning and Economic Development Director shall decide in all other cases.

- A. The waiver or modification is necessary because of safety or design factors unique to the use, circumstance or site.
- B. The minimum possible light intensity is used that would be adequate for the intended purpose. Consideration shall be given to maximizing safety and energy conservation, and to minimizing light pollution, off-site glare and light trespass on to neighboring properties or street rights-of-way.
- C. For lighting related to streets or other vehicle access areas, a determination is made that the purpose of the lighting cannot be achieved by installation of reflectorized markers, lines, informational signs or other passive means.
- D. Additional conditions or limitations may be imposed by the review authority to protect the public health, safety or welfare, or to fulfill the purpose of this Chapter.

SECTION 138-10.206 – Compliance

Where a preliminary investigation indicates that a site is not compliant with this chapter, it shall be the responsibility of the owner to verify compliance.