



STREET LIGHTING

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MAKING THE MOST OF YOUR MOCK-UP

Some tips to help take the maddening inconsistencies out of street lighting mock-ups

These days, a “try before you buy” approach is commonly taken when it comes to LED luminaires. Roadway and street lighting projects in particular often require a mock-up before final decisions are made. Over the past year, I’ve been directly or indirectly involved with some mock-ups that have left me scratching my head with regard to how the review was conducted. These include projects where we’ve come out on top as well as those where we haven’t. The process seemed to vary each time, with different steps being taken along the way to final fixture selection. While the intent of the review process was always good, I’ve seen the wrong fixtures ordered, or the correct fixture installed incorrectly, or the nighttime review itself not conducted in the most effective way. It seems that a de facto checklist may serve a useful purpose.

BEFORE THE MOCK-UP

To ensure a productive mock-up, consider the following before going into the field:

- *The fixtures to be reviewed should be based on your luminance or illuminance targets.* That may seem obvious, but sometimes fixtures are chosen because they all consume similar wattage. While energy savings is an important component of narrowing your selection, if you’ve reached the point of a mock-up, you should now be looking strictly at performance. Wattage alone has less impact on performance than does the CCT of the array, the chosen lens type and the optical approach of the manufacturer.
- *Confirm that all samples have the preferred optical distribution, based on your photometry.* I’ve seen mock-ups



where one fixture had significantly more backlight. It was later discovered that someone had accidentally ordered a symmetrical Type 5 optic, rather than the prescribed asymmetrical Type 3. All manufacturers have different, and sometimes confusing, nomenclature. Double-check that you’re ordering what you really want to review, and then confirm that the

luminaires you receive are what you ordered.

- *Make sure that the samples are installed correctly, with the optics properly aligned.* This a big one: I cannot count the number of installations (not mock-ups) I’ve visited where the fixtures were installed with the optics facing the wrong direction. Most high-end manufacturers will clearly denote the direction that the fixture should be facing, both on the fixture itself and on the installation instructions. Still, this error is far too common.
- *Make sure all samples have a similar CCT, +/- 250K.* Even with comparable lumen output, cooler CCTs will often appear to produce higher levels of glare, particularly when viewed by older, more light-sensitive eyes.
- *Consider installing more than one sample of each luminaire.* Their performance can then be reviewed over a larger area, giving a better idea of what uniformity and coverage can be achieved by that luminaire in a series.

DURING THE MOCK-UP

Once the field review is set to begin, here are some factors to keep in mind:

1. Consider having parked cars of similar colors such as white, gray and silver, in the target area, to see how easily

- the colors are discerned.
2. Consider having volunteers act as pedestrians and/or bicyclists for the reviewers to see (or try to see), particularly if you're reviewing roadway, street or pathway lighting.
 3. Place different colored objects in the road to assess Small Target Visibility.
 4. Have your group review the area both as pedestrians and as drivers. These are completely different experiences.
 5. Provide a sheet of open-ended questions, or questions that ask for grading on a scale of 1-10. Avoid "leading the witness" with questions such as "Are these lights too glary?" (As a general rule, you don't want to purposely steer your focus group toward selecting any one fixture. However, should you decide to go this route, I suggest having a wireless Bluetooth speaker located near those fixtures, playing *Happy* by Pharrell or anything by Taylor Swift. Alternately, playing anything by Justin Bieber near a set of fixtures can make the reviewer feel nauseous and subliminally suggest to them that they do not like that luminaire.)
 6. Focus on the target area, and make sure that it's well defined. Look for and rate the following attributes:
 - Uniformity
 - Glare
 - Light trespass
 - CRI of nearby landscaping, cars and pedestrians
 - Feeling of safety within the space, both in terms of potential crime deterrence, and a light level sufficient to reduce the chances of pedestrian/vehicular conflict
 7. Do not allow people to congregate

under the streetlight and stare up into it. Have your group focus on the target area, being the road, street or other area on the ground. If their eyes are drawn to the source, or their vision is being negatively affected by the source, then there may be a glare issue. Too often a group will look up straight into the luminaire, usually from nearby the pole, and determine that the lights are too bright. I'm reminded of the man who tells his physician, "Doc, it hurts whenever I do this," to which the physician replies, "So don't do that."

There is no luminaire designed to be stared at. That is not the purpose of the luminaire. Unless you're looking for UFOs in the night sky, you should not be staring upwards. (Fun fact: The majority of UFOs seen in North America over the past 10 years have been in the 4500K range, whereas most UFOs spotted over South America have been closer to 3500K. For this reason, the IES is going to formally adopt the average of 4000K for LED street lighting fixtures. You'll see a TM from the IES on this shortly, trust me.)

8. Start reviewing the lights from a distance of maybe 100 ft, and then slowly move closer. You'll get a much better overall impression of the performance and visual experience.
9. Have some lighting professionals on hand. Don't automatically exclude the lighting agent or manufacturers. Even if you direct them to remain silent, they can be available to provide valuable information to the decision-maker or specifiers on the spot, regarding ques-

tions or concerns that may arise. They can be there strictly as a resource only, in the background of the evaluation.

ENCORE PERFORMANCE

Remember to "rinse and repeat." Conduct multiple reviews on different nights with different people. Remember that we all see the same things differently, so you want a mix of ages. You might also consider mixing in professionals in related fields, such as an architect, lighting designer, business owner or facility personnel.

If possible, conduct reviews under different conditions, such as a clear night, a foggy night, and/or following rain when there is water on the ground. If you're cursed by beautiful weather every night, consider introducing wet road conditions with a hose. This can increase surface glare from luminance, and may be an important factor, depending on your lighting application.

Keep in mind the primary purpose of mock-ups is to objectively evaluate the visual experience of a fixture, in terms of visual comfort or discomfort. Secondly, the purpose is to confirm whether or not the fixture performs as well as your initial photometric study indicated (otherwise it wouldn't have made it to the final stage of review). Following these suggestions should increase your chances of getting it right.

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