Background Light Level from Neighboring Residences in On Tai Estate of Hong Kong

Mr CHAN Sui Hing, BEng (Hons) in Building Services Engineering, Faculty of Science and Technology
Supervisor: Ir Dr Roger NG, Assistant Professor

Background

- Hong Kong's population density has reached 6880 ppl/km^2.
- Energy consumption on the lighting system is immense to keep the city more prosperous even at night.
- There is an elevated issue in light nuisance among the communities.
- Light is emitted from various sources onto the dwellings adjacent to the targeted area.

Research Questions

- While lighting from densely packed high-rise buildings paints a beautiful nightscape for Hong Kong, frequent complaints against light nuisance rises.
- Vertical illuminance on windows is commonly used to assess light trespass.
- The measured value of this parameter can result from all surrounding light sources, including the spill light from neighboring residences.

Objectives

- The main purpose of this research is to investigate the impacts of light nuisance on the units of a highly-dense residential estate in Hong Kong through light trespass caused by the neighboring residential units of the same estate.

Methodology

- Lighting simulations were conducted for On Tai Estate and the situation of light trespass of the residential units due to the spill light from the neighboring units was analyzed.
- DIALux was the computer software used. Vertical illuminance of the units' windows facing outside was calculated.
- On Tai Estate was chosen because it is one of the most highly-dense populated estates in Hong Kong, and of the Elongated Cruciform that has been adopted in recent years.
- The calculated results were compared with the required values during the pre-curfew and post-curfew periods as stated in local design guidelines.

Step 1
- Select proper Lighting Simulation Software

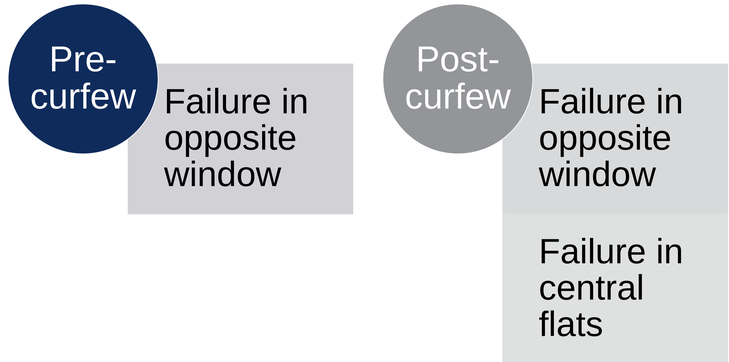
Step 2
- Choose suitable targeted estates for estimation

Step 3
- Making reasonable assumption for simulation

Step 4
- Compare the result to contemporary standards

Findings

- It was found that the design of Elongated Cruciform residential estate has negative impacts on light nuisance due to light trespass from neighboring units.
- It is suggested that the opposite window arrangement should be re-arranged to avoid direct light trespass.



Conclusion

- Impose a Y-Shape Block or X-Shape Block which possesses 120 degrees > 90 degrees structure.
- Provide adequate space distance between flat to flat.
- Re-locate the window to avoid facing opposite flats.
- Produce simulations before construction.
- Providing light filters on the glass of windows to lower the transparency.
- Offer some curtains for each window.