

Appendix P – yongeTOmorrow Electrical Engineering Assessment Memo



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Re: Electrical Engineering Services
Yonge Street EA Study
PP – 20 270

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In this assessment we considered poles, fixtures, luminaires, and best practices that best suit the streetlighting and pedestrian lighting requirements on Yonge St between Queen St and College St. The cultural and historical significance of this stretch of land was considered for every decision that was made. Optimal lighting levels are being met while still providing pedestrians with the experience that Yonge-Dundas has come to embody. There were very few exceptions where standard design guidelines took precedence over aesthetics. The primary design considerations were:

1. A uniform spread of light on the surface of the travelways (roadways and sidewalks).
2. Illumination values that are consistent with Toronto Hydro standard requirements for roadway classifications as per RP-8-18. Yonge St is a major arterial road and any lateral streets off Yonge St are major roads which means intersections in this area are classified as major-major and command a specific set of criteria.
3. Illumination values that are consistent with City of Toronto requirements for pedestrian travelways that are classified as having high pedestrian traffic.

Receiving approval from THESL (Toronto Hydro Electric System Ltd) to utilize a single shared pole to mount the pedestrian luminaire and roadway luminaire will be challenging because it is not listed in their approved standards and will require a PSA (Project Specific Agreement) to execute. Custom poles typically take longer to get approval as there are more obstacles regarding ownership and maintenance of the pole. This pole will require two completely separated channels for the cables; one to feed the fixture for roadway lighting and the other to feed the fixture for pedestrian lighting.

Road Classification

Yonge Street's classification is determined based on the volume of pedestrian and roadway traffic. If we are assessing lighting conditions for the current roadway classification, we must meet and maintain classifications for a major arterial roadway. This classification can be changed in the future if the City of Toronto approves a change in classification. However, it is unclear at this point in time what that classification would become (major, minor, arterial, collector, medium, local, etc). If the road classification changes, the pedestrian conflict classification will also change which means the City of Toronto would have to confirm the new classification (high pedestrian conflict, medium, low, etc).

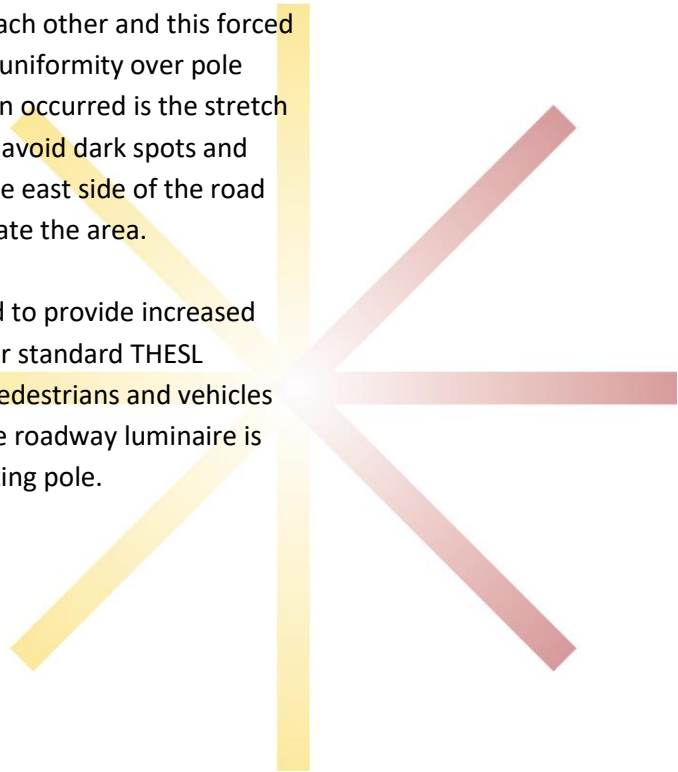
If Yonge Street's classification is lowered from major arterial to another roadway/vehicle classification (i.e. a local or medium traffic road), the resulting design change would simply be to change the wattage of the roadway luminaires. However, if the existing roadway became a pedestrian-only travel way, this change in classification would require more extensive changes to the design (i.e. mounting heights, pole locations, wattages, etc.). The lighting requirements for a major arterial road (and adjacent crosswalks) are stricter when compared to a local road or a pedestrian travel way due to the immense vehicle volume.

Roadway Lighting Summary

The roadway luminaire attachment height at 9.1m (30ft) is commonly used and provides the required vertical space for large roadway vehicles travelling on Yonge St and turning at intersections. A pole spacing of roughly 50m was found to be ideal for optimal lighting when employed with LED Capella luminaires.

Some of the intersections along Yonge St were in proximity of each other and this forced us to select light pole locations that prioritized illumination and uniformity over pole spacing. The most significant example of where this prioritization occurred is the stretch of sidewalk on Yonge St between Dundas St W and Gould St. To avoid dark spots and provide a uniform spread of light we proposed a light pole on the east side of the road but not on the west as adding a second pole would over-illuminate the area.

At the intersections, a higher wattage roadway luminaire is used to provide increased lighting levels for increased visibility and pedestrian safety as per standard THESL requirements for mixed-use crosswalks (road crossings where pedestrians and vehicles share a common space). Between intersections, a lower wattage roadway luminaire is required when utilizing a joint-use pedestrian and roadway lighting pole.



A 3000K colour temperature is used to reduce eye strain and provide a warm atmosphere. Luminaires can be changed to a 4000K colour temperature if the City of Toronto calls for a “truer” representation of colour for pedestrians travelling throughout the area but increasing the colour temperature means the light will appear closer to a daylight source of light which is not necessarily consistent with the experience of being at Yonge-Dundas Square. Some intersections have a higher wattage streetlight which helps reduce pole counts at intersections while providing adequate lighting.

THESL roadway luminaires are powered from THESL-owned secondary cables (120V or 120/240V) which span through Toronto. These secondary networks provide power to streetlight supply circuits via underground tap boxes, overhead secondary bus cables, etc. The first streetlight pole in every underground fed circuit has a pole breaker to protect the streetlight circuit and assets upstream from fault currents.

Pedestrian Lighting Summary

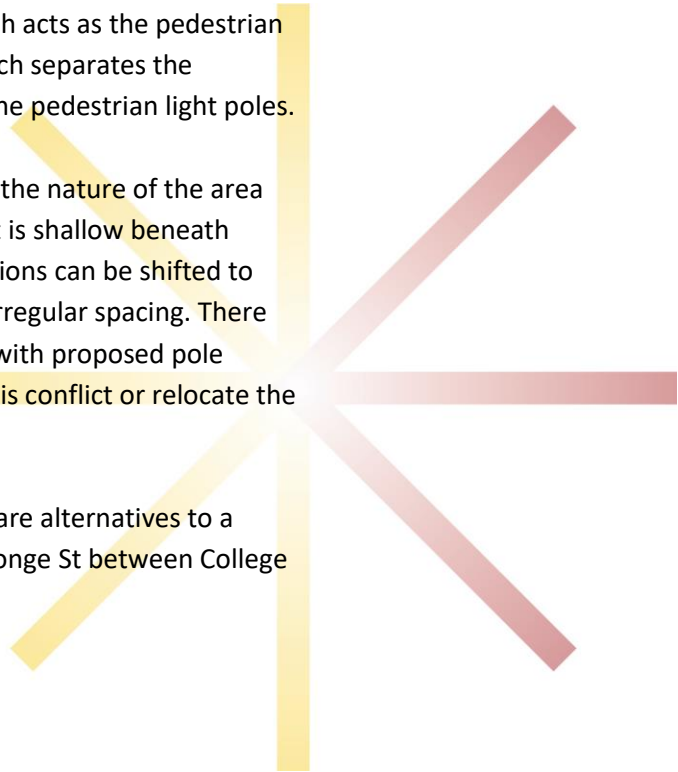
Part of the proposed pedestrian-focused efforts for Yonge St include an increased sidewalk space which means that there is a larger area to illuminate than a typical sidewalk in Toronto. The pedestrian luminaire attachment height of 6.1m (20ft) was selected to achieve a lighting uniformity along the widened boulevard space that avoids dark spots. Dark spots can cause someone utilizing the space to feel unsafe which is why it is critical to achieve optimal lighting uniformity.

The 20ft attachment height used for the pedestrian luminaires will not cause light trespass onto the buildings along Yonge street. A 3000K colour temperature was selected for pedestrian luminaires to be consistent with the roadway luminaires.

BIA (Business Improvement Area) pedestrian luminaires are not owned by THESL and therefore must be powered through a BIA-owned pedestal which acts as the pedestrian lighting supply point. The pedestal is the demarcation point which separates the incoming THESL-owned supply from BIA-owned assets such as the pedestrian light poles.

Typically, poles are direct buried within the sidewalk but due to the nature of the area we are working within, there may be existing infrastructure that is shallow beneath grade i.e., TTC tunnel/stations, unknown utilities, etc. Pole locations can be shifted to accommodate underground obstacles, but this would result in irregular spacing. There may be services such as THESL hydro services that may conflict with proposed pole locations, but it is possible to attempt to shift poles that have this conflict or relocate the existing service.

In locations where we are not able to directly bury poles, there are alternatives to a direct buried installation. For example, under the sidewalk on Yonge St between College



and McGill, there is going to be a shallow concrete structure (<300mm) installed due to proposed TTC works in the area. Typically, in a scenario such as this, it is possible to design a reinforced sidewalk slab that acts as the footing for the pole and base plate/bolts. However, there are limitations to consider with this approach:

1. A reinforced sidewalk slab and spread footing may still need to be deeper than 300mm (as per THESL construction standards) which may cause conflict for a concrete structure that is less than 300mm below grade. How the reinforced sidewalk spread is designed depends on the height and weight of the pole.
2. A reinforced sidewalk slab has significantly higher costs due to additional materials and design implications.

Kind Regards,

Kevin Malott,
Designer

Acronyms:

THESL: Toronto Hydro Electric System Ltd

BIA: Business Improvement Area

PSA: Project Specific Agreement

RP-8-18: Recommended Practice for Design and Maintenance of Roadway and Parking Facility Lighting. It is a document which many municipalities use as their guidelines for determining lighting requirements.

Counts:

45x 35W LED, 3000K Type 2, Pedestrian Capella Luminaire

33x 70W LED 3000K Type 2, Roadway Capella Luminaire

26x 90W LED 3000K Type 2, Roadway Capella Luminaire

7x 110W LED 3000K Type 3, Roadway Capella Luminaire

45x 0.5m Brackets for Pedestrian Luminaire

66x 1.0m Brackets for Roadway Luminaire

79x 30ft Base-mounted Poles

20x Pole breakers (Estimate)

40x Ground Rods (Estimate)

2250m Cable (Estimate)

2250m Duct (Estimate)

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