



CITY OF HAMILTON

PUBLIC WORKS DEPARTMENT
Environment & Sustainable Infrastructure Division

TO: Chair and Members Public Works Committee	WARD(S) AFFECTED: CITY WIDE
COMMITTEE DATE: June 6, 2011	
SUBJECT/REPORT NO: Comprehensive Outdoor Lighting Study: Sidewalk and Roadway Lighting (PW11041) (City Wide)	
SUBMITTED BY: Gerry Davis, CMA General Manager Public Works Department	PREPARED BY: Mike Field (905) 546-2424, Extension 4576 Hart Solomon (905) 546-2424, Extension 4584
SIGNATURE:	

RECOMMENDATION

- (a) That Appendix "A" attached to Report PW11041 respecting the Policy for Sidewalk and Roadway Lighting be approved;
- (b) That Appendix "B" attached to Report PW11041 respecting the Sidewalk and Roadway Lighting Upgrade Implementation Plan be approved;
- (c) That Appendix "C" attached to Report PW11041 respecting the Comprehensive Outdoor Lighting Study be received.

EXECUTIVE SUMMARY

The Task Force on Cleanliness and Security in the Downtown Core requested that the Traffic Engineering Section conduct a lighting study that would address and make recommendations about outdoor lighting and how it could contribute to reducing crime, reducing the fear of crime and improving the sense of security within the Downtown Hamilton Community Improvement Project Area. Since the City has no right-of-way (sidewalk and roadway) lighting policy for any part of the City, the opportunity was taken to use the study research, information, guidelines and framework to develop a consistent sidewalk and roadway lighting policy for the City as a whole, rather than just the Downtown.

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The study that resulted, the Comprehensive Outdoor Lighting Study (included in the report as Appendix "C"), addresses the following types of lighting in the Downtown: roadways, intersections, sidewalks, parks, plazas and parking lots (public and private). The study considers roadway, sidewalk and alleyway lighting for the other 11 BIAs specifically. As well, the study considers roadway and sidewalk lighting for all City streets and roads in general.

This staff report addresses only the roadway-related lighting (sidewalks, roads, intersections and alleyways); that is, lighting on the road right-of-way. The remaining issues off the road right-of-way will be reported on separately to the Planning Committee.

Included as part of this staff report is Appendix "A" - Policy for Sidewalk and Roadway Lighting and Appendix "B" - Sidewalk and Roadway Lighting Upgrade Implementation Plan.

The key highlights of the study, policy and plan are as follows:

City Wide:

- The absence of a comprehensive sidewalk and roadway lighting policy that governs the design, application and implementation of lighting has resulted in a wide variety of lighting levels and some sub-standard conditions. Additionally, due to past industry practices that were focused on roadway lighting nearly exclusively, the pedestrian environments do not fully meet the spirit of the City's vision and walkability strategies. The implementation of a sidewalk and roadway lighting policy, focused first on pedestrian needs, will assist in working towards those goals.
- When lighting is designed and installed to nationally recognized standards, safety and security is improved. The secondary benefits to good night-time lighting include enhancement of the City's image, improved commerciality of downtown(s), an enhanced feeling of comfort and increased public night-time usage/enjoyment.
- Areas which now have lighting (urban roadways, urban intersections, and rural intersections) should continue to be lit as at present. Overall lighting levels are adequate for much of the City but deficient in some areas, particularly in areas with high volumes of pedestrians. In situations where existing lighting conditions are over-lighted there is potential to reduce the lighting levels which will lead to energy and maintenance savings.
- It is recommended that alleyways (residential and commercial) not be provided lighting unless they are the only route of access/egress or the application for lighting has been reviewed and approved based upon consultation with City Traffic Engineering staff, Hamilton Police Service and the governing BIA Management board (if applicable). The installation of owner installed and operated security lighting should be advocated.

Downtown Hamilton Community Improvement Project Area:

- It is recommended that the existing practice of installing white light sources be continued and mandated in the sidewalk and roadway lighting policy. The improved colour rendition of white light has many benefits related to safety, security and image.

As noted, the lighting study recommended that a policy would assist in realizing the benefits of adequate right-of-way lighting and ensure that new lighting installations and upgrades would be designed consistently city-wide. To date, the City has not had such a policy. A policy has now been developed by the consultant and staff and is attached to this report. The lighting study's recommendations for a policy are based upon nationally recognized lighting standards and practices, specifically the Transportation Association of Canada's "Design Guide for Roadway Lighting" and the Illuminating Engineering Society of North America's "Recommended Practice for Roadway Lighting RP-08". These guidelines are the most used, recognized and accepted in North America, and have credibility with the courts.

The policy will be used to govern the design and application of right-of-way lighting City-wide. This applies to instances such as new residential developments, capital improvement projects and lighting upgrade projects.

The majority of the sidewalks and roadways City-wide meet or exceed the parameters of the proposed policy, however some portions do not. To define priorities in upgrading, staff have developed an implementation process. This implementation process (attached as Appendix "B" of this report) will prioritize all known deficient and missing sidewalk and roadway lighting conditions by evaluating based on road and pedestrian safety and lighting standard deficiency factors, while recognizing Council emphasis on the Downtown. The resulting implementation plan will provide direction for capital budget expenditure, subject to funding availability and competing initiatives, in association with the sidewalk and lighting policy. This will ensure that lighting upgrades are executed in the most effective and strategic manner.

The implementation plan shall be used only as a planning tool for defining the upgrade priorities for existing deficient right-of-way lighting conditions City-wide.

With the exception of how the lighting of alleyways is defined and the mandate of white lighting within the downtown core, neither the lighting policy nor associated upgrade implementation plan propose to fundamentally change the way that sidewalk and roadway lighting is operated. It is projected that the introduction of both the policy and implementation plan will introduce further efficiencies regarding design and execution of activities related to street lighting.

Alternatives for Consideration - See Page 8

FINANCIAL / STAFFING / LEGAL IMPLICATIONS

Financial: The approval of the policy and plan do not have immediate financial implications. They do provide direction on the best way to spend capital funds, when

available, on streetlighting upgrades. Most of the existing streetlighting capital budget is expended on infrastructure rehabilitation, repairing and/or replacing aging poles, wiring systems and hardware. A small amount of funding is typically available annually for upgrading lighting, usually for safety and spot improvements only. It is estimated that the upgrades to meet the standards in the Downtown could cost potentially in the range of \$ 3-5 million. The variation in cost is attributed to the rehabilitation/replacement of existing supporting infrastructure such as electrical distribution and poles. Some or much of this could be achieved at such time as road improvements or streetscaping projects are undertaken. Where street lighting upgrades are required to mitigate specific safety related issues, the types of projects will be identified independently in the capital budget. To achieve the upgrades and delete deficiencies, formal stand-alone capital budget submissions will be required. These will have to compete with other capital priorities. In some instances, the resulting upgrades will marginally increase the energy cost and/or the cost of maintenance (particularly the change to white lighting in the Downtown core). Capital budget submissions will reflect these current budget impacts wherever they can be quantified. In the future, the use of LED lighting sources for upgrades will lower energy costs and potentially reduce maintenance costs.

Staffing: The current Traffic Engineering staffing complement is adequate to manage this enhanced program (implementation plan) and to ensure that the sidewalk and roadway lighting policy is being followed. It is expected that the use of the policy and implementation plan will introduce further efficiencies into how Traffic Engineering plans, designs and executes activities related to street lighting. Following final approval, the policy and implementation plan can be utilized immediately.

Legal: There are no legal implications of the study, the sidewalk and roadway lighting policy or associated implementation plan. Claims and lawsuits related to street lighting issues are rare and the implementation and subsequent use of a sidewalk and roadway lighting policy (which incorporates nationally accepted standards that are widely accepted in Canadian courts of law) will further minimize the City's exposure and risk.

HISTORICAL BACKGROUND

In October 2007, the Task Force on Cleanliness and Security in the Downtown Core completed a study entitled "*Protecting the Future: A Safety and Security Audit of the Downtown Improvement Project Area*". The purpose of this study was to make recommendations for the creation of an action plan designed to result in enhancements to the safety and security of the Downtown Hamilton Community Improvement Project Area.

In response to the study's conclusions and recommendations, in late 2008, the Task Force on Cleanliness and Security in the Downtown Core requested that the Traffic Engineering Section of Public Works initiate and manage a lighting study of the Downtown Hamilton Community Improvement Project Area. The purpose of the lighting study was to review existing conditions and make direct recommendations that would satisfy the objectives of the safety audit study. The types of lighting to be considered were specified as wide-ranging, including both on-street and off-street areas.

The road and sidewalk component was a major portion of the study. Since the City has never had a formal sidewalk and roadway lighting policy (right-of-way lighting) and since the lighting study was to include significant research and information on Downtown sidewalks and roads, staff suggested that the scope of the study be expanded to develop a City-wide policy. This would ensure City-wide consistency. This strategy was accepted and the scope of the study was subsequently expanded at a small extra cost.

In early 2009, a terms of reference for the lighting study was developed based upon input from the Task Force on Cleanliness and Security in the Downtown Core and comments/recommendations made within their safety audit study. Through a competitive request for proposal (C11-41-09) in August of 2009, DMD and Associates Ltd. were hired as the consultant on the project.

In November of 2009, the consultant and Traffic Engineering staff conducted a series of formal and informal meetings with various internal and external stakeholders. Additionally, on November 26, 2009, a public consultation session was conducted, in conjunction with an online survey which was posted on the City's website. Information gathered from the meetings was consolidated and assisted in guiding and refining the focus of the lighting study.

Through the fall of 2009 and spring of 2010 the consultant conducted extensive field investigations where information regarding current lighting conditions was collected. Additionally, computer generated models were created and utilized to simulate existing lighting conditions based upon City GIS data.

Following the information gathering exercise and consultations, the consultant assembled all available information and developed the final draft recommendations and project report. The final draft was presented to the Task Force on Cleanliness and Security in the Downtown Core in mid-July 2010. As a result of the presentation, the Task Force formally received the study and directed staff to report to the Public Works Committee with the recommendations in respect to the lighting study. Additionally, the Task Force requested that an implementation plan be developed to assist in bringing the content of the study to a realization.

Upon the finalization of the lighting study, and acceptance by the Task Force on Cleanliness and Security in the Downtown Core, Traffic Engineering prepared a formal sidewalk and roadway lighting policy and associated implementation plan, using the study's content as a guideline.

POLICY IMPLICATIONS

As per recommendation (a), it is recommended that a new policy, entitled "Policy for Sidewalk and Roadway Lighting" be adopted. This would be the first time the City would have a formal sidewalk and roadway (street lighting) policy. This will serve to provide a reference standard for the planning, design, and upgrading of street lighting infrastructure.

The policy is based on accepted national and international standards, but is structured to recognize that lighting is primarily for pedestrians. It will ensure consistent lighting

levels, maximizing the objectives of lighting, yet minimize costs by not over-lighting areas.

The recommendations promote a healthy environment by appropriate planning and management of the built environment, aligning with the Public Works Strategic Plan “Innovate Now”.

RELEVANT CONSULTATION

As noted, the Task Force on Cleanliness and Security in the Downtown Core initiated the lighting study and was therefore one of the primary consultation resources. Two workshops with the Task Force were conducted. The first workshop was at the initial stage of the project (November 25, 2009) to review the terms of reference for the project and to collect the Task Force’s comments in respect to what they determined were the main issues. The second workshop with the Task Force (July 9, 2010) was conducted towards the final stages of the study to present, review and refine the recommendations and next steps. Through the duration of the lighting study project, the City’s project manager attended or provided regular updates at Task Force meetings, which were generally held on a quarterly basis.

The consultant attended one regular meeting of the Hamilton Association of Business Improvement Areas (November 10, 2009) at the initial stage of the project and presented a general overview. Additionally, the consultant requested to meet individually with each BIA to collect specific information related to the objectives of the study. Between November 2009 and June 2010 the consultant and city staff met with nine of the thirteen BIA’s. The minutes from these meetings are included in the study document and comments received were utilized in forming the recommendations.

Hamilton Police Service (Staff Sergeant Mark Cox being the primary contact) was consulted on several occasions through the duration of the project. A formal meeting was conducted at which thirteen beat officers that patrol the downtown core attended in addition to HPS’s CEPTD officer (Crime Prevention Through Environmental Design). The consultant collected comments in respect to the study’s safety and security objectives specific to policing issues within the downtown core. Much of the information that was gained from this meeting was incorporated into the lighting study and directly assisted in forming the recommendations. The minutes from this meeting are included in the study document.

On November 26, 2009 a public information centre was held at the Hamilton Convention Centre to gain input from the public regarding outdoor lighting. A public notice was posted in the Hamilton Spectator and at community centres throughout the city. A series of information boards were displayed at the PIC (included in the study document) in addition to a questionnaire. Comments that were received were taken into account in the report.

A Technical Advisory Committee (TAC) consisting of two staff members from Planning and Economic Development, two staff members from Public Works and one staff member from Community Services was formed for internal consultation purposes. Two

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TAC meetings were held so that members could provide their input based upon their review of the content and recommendations of the lighting study, in addition to their department/section interests.

As part of the research and investigation that the consultant conducted various representatives from the Transportation Association of Canada and the Illuminating Engineering Society of North America were informally consulted.

Prior to the finalization of the lighting study, the City's project manager conducted a series of meetings with various internal and external stakeholders to review the recommendations of the study in order to gain their endorsement. These stakeholders included:

- Public Works: Transportation, Energy and Facilities - Traffic Operations; Energy, Fleet and Facilities;
- Planning and Economic Development: Downtown and Community Renewal - Neighbourhoods; Parking and By-Law Services - Hamilton Municipal Parking System;
- Hamilton Police Service;
- Horizon Utilities Corporation.

All input that was collected from the various stakeholders was considered in developing the final lighting study, sidewalk and roadway lighting policy and implementation plan.

ANALYSIS / RATIONALE FOR RECOMMENDATION

The Task Force on Cleanliness and Security in the Downtown Core has previously formally received the lighting study and directed that it be forwarded to the Public Works Committee on their behalf. The Comprehensive Outdoor Lighting Study contains vital information related to outdoor lighting and defines the justification for and what specific role lighting plays in relation to pedestrian safety, vehicular safety, real and perceived safety and security and City image/commercial enhancement.

The content of the study provides recommendations and guidelines that assist in meeting the goals and objectives of downtown renewal efforts which are shared by the Task Force on Cleanliness and Security in the Downtown Core. The study can serve as a key reference document for Public Works and other departments in terms of the benefits and application of outdoor lighting. Additionally, the study content supports the proposed sidewalk and lighting policy and associated implementation plan.

The proposed policy provides prescriptive direction specific to the needs of the City of Hamilton by defining where lighting is and is not required and to what degree (lighting standards and illumination levels). The policy has been developed based upon the recommendations of the lighting study and is based upon nationally recognized standards and practices. City Staff, the public, lighting designers and developers will use the policy to form the basis for the design and application of sidewalk and roadway

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lighting projects contained within the public right-of-way. The resulting benefits are, but not limited to, such things as the following:

- Pedestrian Safety (Travelling on sidewalks, or parallel to roadways)
- Pedestrian-Vehicular Safety (Pedestrian road crossings)
- Safety and Security - Real
- Safety and Security - Perceived
- Commercial and City of Hamilton image enhancement
- Vehicular Road Safety (Vehicle-vehicle conflicts)

The policy mandates lighting for sidewalks, urban walkways, urban roadways and rural and urban intersections. Rural roadways, alleyways (with some specific exceptions) and freeways (except interchanges) are not required to be lighted. This is typically how lighting has been executed in the past. The policy serves to formalize the requirements of where lighting is required and where it is not.

In addition to the above, the policy also confirms the continuation of the use of 'white lighting' within the Downtown Hamilton Community Improvement Project Area. This assists in improving the image of the downtown and with policing efforts (providing better colour rendering for identification by officers and by surveillance cameras).

The policy document will be used to govern the design and application of right-of-way lighting City-wide. This applies to situations such as new residential developments, capital improvement projects and lighting upgrades.

Annual road construction, streetscaping, development (commercial and residential) and other projects will provide opportunities to consider lighting upgrades. In some instances, particularly in the downtown core, this will work to accelerate lighting upgrades.

In cases where lighting upgrades will directly assist in mitigating road safety related issues these projects will be identified independently from all other types of upgrades. Road safety related upgrades (based upon demonstrated collision data), shall take precedence and shall be considered the highest of priorities.

Together, the proposed sidewalk and roadway lighting policy and implementation plan provide the necessary standards and guidance required to provide right-of-way lighting which enhances the safety and security of the general public, works to improve the City's image and assists in meeting the City's mission, vision, values and goals.

ALTERNATIVES FOR CONSIDERATION

Council could choose to not approve the sidewalk and roadway lighting policy and the implementation plan. This decision would result in a continuation of the lack of city policy related to the design and application of sidewalk and roadway lighting.

CORPORATE STRATEGIC PLAN

Focus Areas: 1. Skilled, Innovative and Respectful Organization, 2. Financial Sustainability, 3. Intergovernmental Relationships, 4. Growing Our Economy, 5. Social Development, 6. Environmental Stewardship, 7. Healthy Community

Skilled, Innovative & Respectful Organization

- ◆ More innovation, greater teamwork, better client focus - the policy and implementation plan fills a void related to the design, application and planning of sidewalk and roadway lighting.

Financial Sustainability

- ◆ Effective and sustainable Growth Management - the implementation plan provides an innovative prioritization of needs in respect to deficient lighting conditions and allows for the planning of works based upon the needs of the community.

Growing Our Economy

- ◆ A visitor and convention destination - policy content assists in taking advantage of the benefits of sidewalk and roadway lighting which includes increased security and safety and improved City image.

Social Development

- ◆ People participate in all aspects of community life without barriers or stigma - policy content assists in taking advantage of pedestrian oriented sidewalk and roadway lighting which assists in improving safety and security of public right-of-way users.

Environmental Stewardship

- ◆ Aspiring to the highest environmental standards - the policy sets standards in terms of the 'where' to light and 'how much' to light. This works to avoid over-lighting and wasting resources.

Healthy Community

- ◆ Adequate access to food, water, shelter and income, safety, work, recreation and support for all (Human Services) - policy content promotes increased security and safety.

APPENDICES / SCHEDULES

Appendix "A": Proposed Policy for Sidewalk and Roadway Lighting

Appendix "B": Proposed Traffic Engineering Sidewalk and Roadway Lighting Upgrade Implementation Plan

Appendix "C": Comprehensive Outdoor Lighting Study (bound document under separate cover)

Title	Policy for Sidewalk and Roadway Lighting
Number	

1. Description and Purpose

This policy document provides guidelines for the design and application of sidewalk and roadway lighting contained within the public right-of-way.

In its simplest form, lighting is required to improve visibility during the hours of darkness. Research and analysis confirms that when applied to the context of sidewalks and roadways, lighting can play a key role in relation to topics such as improving safety, security, and City image. Therefore, it is important that the parameters to which lighting is applied are defined such that it may be designed and installed appropriately in order to ensure that the benefits can be achieved.

The overall goal of this policy is to provide the necessary parameters needed to design and apply lighting for sidewalks and roadways that will directly benefit, but not limited to, the following:

- Pedestrian Safety (Travelling on sidewalks or parallel to roadways)
- Pedestrian-Vehicular safety (Pedestrian road crossings)
- Safety and Security - Real
- Safety and Security - Perceived
- Commercial and City of Hamilton image enhancement
- Vehicular Road Safety (Vehicle-vehicle conflicts)

2. Scope

Applies to: <input type="checkbox"/> All sections <i>or</i> <input type="checkbox"/> Asset Management <input type="checkbox"/> Design <input type="checkbox"/> Construction <input checked="" type="checkbox"/> Traffic <input type="checkbox"/> Surveys <input type="checkbox"/> Others _____
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This policy is intended to be used by City Staff, the public, lighting designers and developers to govern the basis for the design and application of sidewalk and roadway lighting projects contained within the public right-of-way. The fundamental purpose of the policy is to provide a uniform structure for the ongoing provision of lighting across the City carried out by the City, developers and other stakeholders.

3. Definitions

The following is a partial list of more commonly used definitions associated with sidewalk and roadway lighting:

3.1 Lighting Terminology

- **Light** – Light is radiant energy in the visible (to the human eye) part of the electromagnetic spectrum between 380-770nm.

- **Lux (lx)** – A unit of measurement for illuminance in the International System of Units (SI). It is defined in terms of lumens per meter squared (lm/m^2). The imperial equivalent of lux is the footcandle (fc).
- **Intensity (Candlepower)** – Intensity (Candlepower) refers to the concentration of light in a particular direction, while lumens represent a total quantity of light emitted. Intensity is expressed in candelas (cd). The concentration of light will normally change for each direction of light emission. This is not required for a lighting calculation; however it is an important lighting fundamental.
- **Illuminance** – When light is incident upon a surface it will create “illuminance” on that surface. Illuminance is a measure of the light landing on a defined area. The more lumens on a given surface area, the higher the level of illuminance will be. The human eye does not see illuminance or the light incident on a surface; it sees only the proportion of the light reflected from the object back into the eye. Illuminance is measured in lux.
- **Luminance** – Luminance is the concentration of light (intensity) reflected towards the eyes per unit area of surface. Luminance represents the amount of illumination reflected into the eyes of the viewer and is dependant upon the reflectivity of the object that the light is reflecting from. Luminance is measured in candelas per square meter (cd/m^2).
- **Uniformity** – Uniformity is the evenness of the light over a given area. Even lighting throughout an area would have a uniformity ratio of 1:1. A high degree of uniformity of roadway lighting has generally been accepted as desirable. As lighting calculations consist of a series of grid points with calculated luminance or illuminance levels, uniformity is expressed as the ratio of the average-to-minimum levels and/or the maximum-to-minimum levels.
- **Veiling Luminance** – Veiling luminance is a numeric evaluation of un-desirable (or disability) glare. Because of contrast reduction by disability glare, visibility is decreased and therefore un-desirable. Increasing luminance levels will counteract this effect by reducing the eye’s contrast sensitivity. As glare limits visibility, veiling luminance is an important, however often omitted, consideration. Veiling luminance must be considered as a design criterion along with illuminance or luminance levels and uniformity. Veiling luminance is calculated in terms of a ratio of the maximum veiling luminance experienced by the observer to the average pavement luminance and is expressed as a ratio value.
- **Colour Rendering Index (CRI)** – Colour rendering index, is a measurement of a light source’s accuracy in rendering different colours when compared to a reference light source with the same correlated colour temperature. It generally ranged from 0 for sources light low-pressure sodium lamps, which is monochromatic, to 100, for a source like an incandescent light bulb. Achieving a high CRI (70+) assists in visibility and many other factors associated with what would be deemed as a ‘well lit environment’.
- **Correlated Colour Temperature** – Colour temperature is a description of the warmth or coolness of a light source. By convention, yellow-red colours (like the flames of a fire) are considered warm, and blue-green colours (like light from an overcast sky) are considered cool. Confusingly, higher Kelvin temperatures (3600-5500K) are what we consider cool and lower temperatures (2700-3000K) are considered warm.

3.2 Land Classifications

- **Urban** – Areas within the boundaries of a city, municipality, town or village where the area is built-up with residential or commercial development and has active pedestrian traffic are classified as urban. The classification of urban typically includes a reasonable level of nighttime activity, the presence of sidewalks and roadways with curb and gutter (curb and gutter are not always associated with urban) and a mix of commercial, industrial and residential development in the area. Commercial and residential development in urban areas is typically denser when compared to rural or semi-rural areas. Residential development includes single-family and multifamily developments and apartments. Commercial development includes retail businesses and shops, shopping malls, etc., where pedestrians can travel between local destinations via sidewalks.

- **Rural** – Rural areas are outside of urban areas, with little or no commercial development and little or no nighttime pedestrian traffic. Typically rural roadways have gravel shoulders with open ditches and no sidewalks. Rural areas include farmland and greenfield areas with little or no commercial or residential development. Most Provincial freeways and highways will have a rural classification, except where they run through an urban area.

3.3 Miscellaneous Right-of-way Definitions

- **Sidewalk** - The portion of the right-of-way intended for pedestrian use, normally adjacent to a roadway and separated by a curb. Sidewalks commonly consist of a linear paved slab-on-grade concrete construction.
- **Walkways** – Walkways serve the same purpose as sidewalks but are not normally directly adjacent to a roadway. In the context of sidewalk and roadway lighting, walkways interconnect one roadway to another roadway.

3.4 Pedestrian Activity Levels

- **High Pedestrian Activity** – Areas with significant numbers of pedestrians expected to be on the sidewalks during the hours of darkness are designated as high pedestrian activity level areas. Examples are commercial urban areas, downtowns or city centers with high nighttime activity. A high pedestrian activity area will have 100 or more pedestrians over the one-hour period with the highest average annual nighttime pedestrian volume.
- **Medium Pedestrian Activity** – Areas where fewer pedestrians are expected to be on the sidewalks during the hours of darkness are designated as medium pedestrian activity level areas. Typically, these are urban commercial or industrial areas, and have some or all of the following types of development: multifamily residential, community buildings, neighborhood shopping and transit lines. A medium pedestrian activity area will have 11 to 99 pedestrians over the one-hour period with the highest average annual nighttime pedestrian volume.
- **Low Pedestrian Activity** – Areas where very few nighttime pedestrians are expected to be on the sidewalks during the hours of darkness are designated as low pedestrian activity level areas. This level of activity can occur in any of the cited roadway classifications. However, it is typical of small urban streets with single-family homes and very low density residential developments (e.g., residential subdivisions). A low pedestrian activity area will have 10 or fewer pedestrians over the one-hour period with the highest average annual nighttime pedestrian volume.

3.5 Roadway Type Classifications

- **Freeway** – A freeway is defined as a fully-controlled access roadway for through traffic, with a classification of RFD or UDF (see Table 3.4.1 – Roadway Classification Designation Matrix). Freeways are typically characterized by the presence of interchanges which allow motorists to enter and exit the freeway in a fully controlled fashion onto local, collector and arterial roads. Typical interchange configurations include diamond, cloverleaf, parclo, trumpet and rotary. Freeways are typically high-speed facilities with a posted speed of 90 km/h or greater. Pedestrians and cyclists are restricted from using freeways.
- **Expressway-Highway** – Expressway-highway is defined as a roadway for through traffic with full or partial control of access via interchanges, intersections or roundabouts. Classifications include REU, RED, UEU or UED (see Table 3.4.1 – Roadway Classification Designation Matrix). An expressway-highway may have at-grade signalized or un-signalized intersections or roundabouts. In some cases an expressway-highway may have interchanges similar to those for freeways.
- **Arterial** – An arterial is defined as a roadway primarily for high volume through traffic with classification of RAU, UAU or UAD (see Table 3.4.1 – Roadway Classification Designation Matrix). An arterial will typically have partially-controlled access via traffic signals or roundabouts or non-controlled access via intersections or driveways and sidewalks on both sides of the roadway.

- **Collector** – A collector is defined as a roadway feeding an arterial classification of RCU, RCD, UCU or UCD (see Table 3.4.1 – Roadway Classification Designation Matrix). A collector will typically have partially-controlled access via traffic signals or roundabouts or non-controlled access via intersections or driveways and sidewalks on both sides of the roadway.
- **Local** – A local is defined as a roadway feeding a collector or arterial, with classification of RLU or ULU (see Table 3.4.1 – Roadway Classification Designation Matrix). A local roadway will typically have partially-controlled access via traffic signals or roundabouts or non-controlled access via intersections or driveways and sidewalks on one side of the roadway.
- **Alleyway** – An alleyway is defined as a non-controlled access roadway located along the rear of, or between, buildings for servicing or access purposes. Alleyways typically connect to local or collector roads

First Letter		Second Letter		Third Letter	
R	Rural	L	Local	U	Undivided
U	Urban	C	Collector	D	Divided
-	-	A	Arterial	-	-
-	-	E	Expressway	-	-
-	-	F	Freeway	-	-

Table 3.4.1 – Roadway Classification Designation Matrix

3.6 Reference Standards Organizations

- **Illuminating Engineering Society of North America (IESNA)** – The IESNA is a not-for-profit organization that produces a large number of recommended practice and design guides used for in the North American lighting industry. The organization also provides education programs and certifications. The IESNA has committees made up on engineers, manufacturers, City and Government staff, and others who commonly practice within the lighting industry who author their documents. The IESNA is considered the foremost leader and most respected organization in regards to lighting in North America and much of their research and recommendations form the basis for many lighting standards.
- **Transportation Association of Canada (TAC)** – TAC is a national association with a mission to promote the provision of safe, secure, efficient, effective and environmentally and financially sustainable transportation services in support of Canada’s social and economic goals. The association is a neutral forum for gathering or exchanging ideas, information and knowledge on technical guidelines and best practices. In Canada as a whole, TAC has a primary focus on roadways and their strategic linkages and inter-relationships with other components of the transportation system. In urban areas, TAC’s primary focus is on the movement of people, goods and services and its relationship with land use patterns.

4. Responsibility

The Traffic Engineering Section of the Public Works Department, in conjunction with Planning & Development Engineering and other applicable City Departments and Sections, will be responsible for overseeing the evaluation, planning and design of sidewalk and roadway lighting installations contained within public right-of-ways.

5. Policy Details

Sidewalk and roadway lighting, contained within the public right-of-way, shall be designed and applied as described by this policy.

This document is not meant to be completely comprehensive and is to be used in association with the Transportation Association of Canada [TAC] – Guide for the Design of Roadway Lighting in

conjunction with the ANSI/IESNA RP-8-00 American National Standard Practice for Roadway Lighting.

This policy, together with the above referenced documents shall form the basis of a complete sidewalk and roadway lighting policy for the City of Hamilton.

5.1 Sidewalks

Sidewalks shall be lighted.

Explanation: Lighting is required to allow pedestrians to safely navigate sidewalks as it provides increased visibility, allowing them to see where they are going and mitigating physical hazards associated with tripping and falling. Additionally, it allows those in motor vehicles to view pedestrian activity on the sidewalks which can reduce the potential for pedestrian-vehicular incidences. Lighting enhances the safety of pedestrians as it is a natural crime deterrent and it allows law enforcement, pedestrians and roadway users to observe and report any criminal activities through the increase in general visibility. Unrealistic perceptions of reduced safety and security can be alleviated as lighting creates a positive feeling of comfort and security. This can enhance the City's image and promote economic development.

Application of Lighting:

Sidewalk lighting shall be designed and installed using the *illuminance* method and as listed in Table 5.1.1 – Sidewalk Illuminance Levels.

Pedestrian Activity Level	Maintained Average Horizontal Illuminance (lux)	Average-to-Minimum Horizontal Uniformity Ratio	Minimum Maintained Vertical Illuminance (lux)
High	≥20.0	≤4:1	≥10.0
Medium	≥5.0	≤4:1	≥2.0
Low	≥3.0	≤6:1	≥0.8

Table 5.1.1 - Sidewalk Illuminance Levels

Where sidewalk lighting is planned which includes new or existing trees (at all stages of maturity) the following shall be evaluated and taken into consideration to mitigate the physical obstructions that would be considered detrimental to light distribution:

- Locate luminaires outside of the full growth lines of the species of tree along the roadway;
- When in close proximity to trees, adjust the luminaire light loss factor (LLF) an additional 10% to 20%;
- Reduce pole-to-pole spacing by a factor of 20% to 30%.

5.2 Urban Walkways – Connecting a Roadway to a Roadway

Urban Walkways (connecting a roadway to a roadway) shall be lighted.

Explanation: Urban walkways (connecting a roadway to a roadway) are by function, identical to a sidewalk with the exception that they are not directly adjacent to a roadway. Based upon this, the explanation of sidewalk lighting shall be used for urban pedestrian pathways.

Application of Lighting:

Urban walkway lighting shall be designed and installed using the *illuminance* method and as listed in Table 5.1.1 – Sidewalk Illuminance Levels.

5.3 Urban Roadways

Urban roadways shall be lighted.

Explanation: Studies and research over the last 50 years has shown that properly designed roadway lighting directly and indirectly reduces the number and severity of collisions (vehicle-vehicle, vehicle-pedestrian and vehicle-cyclist) as it aids in improving urban roadway user's

visibility, making objects on the roadway as well as other vehicles, pedestrians and cyclists easier to identify. Similarly to sidewalk lighting, roadway lighting can enhance City image and promote economic development by increasing positive feelings of comfort and perceptions.

Application of Lighting:

Urban roadway lighting shall be designed and installed using the *luminance* method and as listed in Table 5.3.1 – Urban Roadway Luminance Levels.

(Refer to following page.)

Road Area and Pedestrian Activity		Average Luminance cd/m ²	Average-to-Minimum Uniformity Ratio	Maximum-to-Minimum Uniformity Ratio	Maximum-to-Average Veiling Luminance Ratio
Road Type	Pedestrian Activity				
Expressway - Highway	High	≥1	≤3	≤5	≤0.3
	Medium	≥0.8	≤3	≤5	≤0.3
	Low	≥0.6	≤3.5	≤6	≤0.3
Arterial	High	≥1.2	≤3	≤5	≤0.3
	Medium	≥0.9	≤3	≤5	≤0.3
	Low	≥0.6	≤3.5	≤6	≤0.3
Collector	High	≥0.8	≤3	≤5	≤0.4
	Medium	≥0.6	≤3.5	≤6	≤0.4
	Low	≥0.4	≤4	≤8	≤0.4
Local	High	≥0.6	≤6	≤10	≤0.4
	Medium	≥0.5	≤6	≤10	≤0.4
	Low	≥0.3	≤6	≤10	≤0.4

Table 5.3.1 – Urban Roadway Luminance Levels

Where urban roadway lighting is planned which includes new or existing trees (at all stages of maturity) the following shall be evaluated and taken into consideration to mitigate the physical obstructions that would be considered detrimental to light distribution:

- Locate luminaires outside of the full growth lines of the species of tree along the sidewalk;
- When in close proximity to trees, adjust the luminaire light loss factor (LLF) an additional 10% to 20%;
- Reduce pole-to-pole spacing by a factor of 20% to 30%.

5.4 Urban Intersections

Urban intersections shall be lighted, and to a level that is higher than adjoining roadways.

Explanation: Studies and research shows that urban intersection lighting reduces the number and severity of collisions (vehicle-vehicle, vehicle-pedestrian and vehicle-cyclist) as it aids in improving urban roadway user’s visibility. The lighting of urban intersections is crucial in increasing the safety of pedestrians as they utilize intersections to cross roadways and are therefore inherently at a higher risk for vehicle-pedestrian incidences. A well lighted urban intersection supplements integral vehicle lighting (headlamps) and allows drivers to view pedestrians, and other objects, on

the roadway further in advance. In addition, lighting allows pedestrians to safely navigate sidewalks, sidewalk ramps, and roadway crossings as it provides increased visibility, allowing them to see where they are going and mitigating physical hazards associated with tripping and falling.

Application of Lighting:

Urban intersection lighting shall be designed and installed using the *illuminance* method and as listed in Table 5.4.1 – Urban Intersection Illuminance Levels. The highest and most uniform portion of the lighting design shall be within the marked pedestrian crossings.

Roadway Classification	Average Maintained Illuminance at Pavement by Pedestrian Conflict (lux)			Average-to-Minimum Uniformity Ratio
	High	Medium	Low	
Arterial/Arterial	34.0	26.0	18.0	≤3.0
Arterial/Collector	29.0	22.0	15.0	≤3.0
Arterial/Local	26.0	20.0	13.0	≤3.0
Collector/Collector	24.0	18.0	12.0	≤4.0
Collector/Local	21.0	16.0	10.0	≤4.0
Local/Local	18.0	14.0	8.0	≤6.0

Table 5.4.1 – Urban Intersection Illuminance Levels

5.5 Rural Roadways

Rural roadways shall not be lighted with the exception of special circumstances that require lighting.

Explanation: Though research shows benefit in rural roadway lighting, due to much lower pedestrian activity levels and lower driver workloads, when compared to urban roadways, the overall benefit of lighting on rural roadways is greatly reduced. With minimal pedestrians, driver guidance becomes the governing factor on rural roadways. In most instances, integral vehicle lighting (headlamps), retro-reflective pavement markings and signage serve as an adequate method of enhancing driver guidance and therefore a successful business case cannot be shown from a cost benefit standpoint. In special cases (such as complex horizontal/vertical roadway geometry or sections of roadways with a recorded history of a high night to day collision ratio) where it is determined that rural roadway lighting is required to supplement pre-existing pavement markings and signage it shall be deemed applicable. The requirement for rural roadway lighting shall be based upon a comprehensive review of all factors and by utilizing nationally recognized evaluation systems.

Application of Lighting:

When approved, rural roadway lighting shall be designed and installed using the *luminance* method and as listed in Table 5.5.1 – Rural Roadway Luminance Levels.

Roadway Classification	Average Luminance cd/m ²	Average-to-Minimum Uniformity Ratio	Maximum-to-Minimum Uniformity Ratio	Maximum-to-Average Veiling Luminance Ratio
Arterial	≥0.6	≤3.5	≤6	≤0.3
Collector	≥0.4	≤4	≤8	≤0.4
Local	≥0.3	≤6	≤10	≤0.4

Table 5.5.1 – Rural Roadway Luminance Levels

5.6 Rural Intersections

Rural intersections shall be lighted.

Explanation: Studies and research have indicated that the benefits of lighting are typically much greater in the urban areas than in rural areas, with the exception being at rural intersections. The lighting of rural intersections can significantly reduce collisions, specifically late-night/early-morning crashes (by approximately 34 percent). Considering that the majority of rural roadways are not lighted, rural intersection lighting is utilized to identify or ‘delineate’ the exact location of intersections as they can be seen from greater distances. Additionally, lighting enhances rural roadway user’s safety by improving visibility to other vehicles, pedestrians and road-side hazards.

Application of Lighting:

All rural intersections are required to have delineation lighting. The Transportation Association of Canada document: *Illumination of Isolated Rural Intersections – “Warrant for Illumination of Isolated Rural Intersections”* shall be used to determine the requirement, design and installation of full, partial or delineation lighting. All luminaires installed at rural intersections shall be the drop glass cobra head type or an approved equivalent that is visible to roadway users at a distance – therefore acting as a visual way-finder.

5.7 Roundabouts

Roundabouts shall be lighted.

Explanation: The explanation for the lighting of roundabouts is similar to the reasoning for the requirement of lighting on urban roadways, sidewalks and urban intersections (refer to section 5.1 – Sidewalks, section 5.3 – Urban Roadway and section 5.4 – Urban Intersections) as they share similar operational and geometrical characteristics. However, there are also some characteristics that are completely isolated to roundabouts and as a result have unique lighting requirements and objectives. It has been identified by the Illuminating Engineering Society of North America and the Transportation Association of Canada that the lighting of roundabouts can substantially enhance the safety of pedestrian, roadway users (cyclists and drivers) and also supports steady and efficient traffic flow in nighttime operations. Lighting of roundabouts provides enhanced visibility of pedestrians (in crosswalks and intending to use crosswalks) to approaching and exiting vehicles. Additionally, lighting assists in guidance for roadway users as, due to the circular geometry of a roundabout, vehicle headlights are tangential to the roadway and are therefore not pointed in the intended path of travel. Therefore, lighting is a key component that greatly assists in regards to nighttime navigation.

Application of Lighting:

Roundabout lighting shall be designed and installed as prescribed by the Illuminating Engineering Society of North America – DG-19-08 Design Guide for Roundabout Lighting and in conjunction

with the Transportation Association of Canada – Guide for the Design of Roadway Lighting, Part 11 - Roundabouts.

In rural areas where continuous lighting is not present and a roundabout is planned, transitional type lighting shall be designed and installed to mitigate roadway user light adaptation issues. In urban areas, transitional lighting is generally not required unless there is a drastic difference between the existing continuous lighting approaching the roundabout compared to the required lighting levels within the roundabout.

5.8 Alleyways

Alleyways shall not be lighted with the exception of alleyway entrances/exits from roadways, alleyways that are the only route of access/egress to residences or businesses.

Explanation: Alleyways exist throughout the City of Hamilton and are primarily utilized to access private vehicular parking and access to the rear of businesses.. Due to the low speeds at which vehicles travel through alleyways, lighting is not required, with the exception of the entrances/exits to adjoining roadways. The entrances/exits typically have little to no visual sightlines (due to physical barriers such as buildings, etc) and cross perpendicular to sidewalks. As a result, it is beneficial to provide additional lighting to enhance general visibility to vehicles, pedestrians and cyclists for these specific conflict areas. Where alleyways act as the only route of pedestrian access/egress for a building, then the requirement for lighting is based upon the same explanation provided as part of the sidewalks section.

Based upon extensive consultation and recommendations by Hamilton Police Service and Crime Prevention through Environmental Design (CPTED) strategies, it was identified that alleyways can pose a hazard in terms of safety due to little natural surveillance and the number of concealed areas and potential points of entrapment. Lighting in alleyways can create a sense of comfort and security which may in fact be misleading and direct pedestrians into an area of hidden danger. Therefore, the lack of lighting (not lighting alleyways) would not promote pedestrians to use alleyways and advocate the much preferred use of sidewalks adjacent to roadways.

In special circumstances alleyway lighting may be considered, outside of the parameters of this policy, when extraordinary circumstances exist. In these instances, the application of lighting shall be reviewed and planned based upon established CPTED principals and standard lighting practices. The preference in these instances will be to install motion/occupancy sensor actuated lighting unless or as pertaining to the specific needs of the application.

Application of Lighting:

The entrances/exits to alleyways from adjoining roadways shall be enhanced by providing lighting (a luminaire) in very close proximity. The lighting shall be shared with the adjoining roadway lighting system or shall be a dedicated luminaire, specific to the alleyway entrance/exit. Required lighting levels, at a minimum, shall match those required as part of section 5.1 – Sidewalks and section 5.3 – Urban Roadways.

When justified – based upon consultation with Traffic Engineering Staff, Hamilton Police Service and the governing BIA management board (if applicable) – alleyway lighting shall be designed and installed using the *illuminance* method and as listed in Table 5.8.1 – Alleyway Illuminance Levels.

Pedestrian Activity Level	Maintained Average Horizontal Illuminance (lux)	Average-to-Minimum Horizontal Uniformity Ratio	Minimum Maintained Vertical Illuminance (lux)
Medium - High	≥5.0	≤4:1	≥2.0
Low	≥3.0	≤6:1	≥0.8

Table 5.8.1 – Alleyway Illuminance Levels

5.9 Protected Crosswalks

Protected mid-block crosswalks shall be lighted.

Explanation: At present, the only protected crossings are at traffic signals. In the future, the Ontario Traffic Manual Book 15 may permit signed crossings as well. Protected crosswalks are by function, nearly identical to urban intersections, as roadway users are typically controlled by traffic signals, with the exception that they can be located mid-block (between intersections). Based upon this, the explanation of urban intersection lighting shall be used at protected crosswalks.

Application of Lighting:

Protected crosswalk lighting shall be designed and installed using the *illuminance* method and as listed in Table 5.4.1 – Urban Intersection Illuminance Levels and in conjunction with the Transportation Association of Canada – Guide for the Design of Roadway Lighting, Part 12 – Mid-block Crosswalks.

5.10 Freeways

Freeways shall not be lighted with the exception of interchange exit-ramps.

Explanation: Freeways, in terms of explanations, are similar to rural roadways with the exception that access is fully-controlled and pedestrians and cyclists are not permitted to use freeways. Based upon this, the explanation of rural roadway lighting shall be used for freeways. There is benefit to the lighting of freeway interchange exit ramps as it provides advanced warning of an oncoming exit-ramp and enhances driver guidance when approaching, entering and navigating. Additionally, exit ramp lighting acts as a transition between the non-lighted freeway and the fully-lighted roadways that connect to the exit ramp. This assists in mitigating any issues related to driver adaptation in regards to moving from a dark area into lighted area.

Application of Lighting:

Freeway interchange exit ramp lighting shall be designed and installed using the *luminance* method and as listed in Table 5.10.1 – Freeway Interchange Luminance Levels.

Roadway Classification	Average Luminance cd/m ²	Average-to-Minimum Uniformity Ratio	Maximum-to-Minimum Uniformity Ratio	Maximum-to-Average Veiling Luminance Ratio
Freeway	≥0.6	≤3.5	≤6	≤0.3

Table 5.10.1 – Freeway Interchange Luminance Levels

5.11 Hamilton Downtown

Downtown Hamilton (Downtown Hamilton Community Improvement Project Area) shall be lighted with ‘white-light’ lighting.

Explanation: The use of light sources (lamps) that output light in the white section of the colour spectrum and has a high colour rendering index, “white-light”, has many benefits related to safety and security (real and perceived). Lighting sources outside of the white section of the colour spectrum can impact how objects look as a result and “shift” their perceived colour from actual (for example: blue when viewed under a “yellow” light source can appear to be green). Accurate identification of colour directly benefits surveillance (community or law-enforcement) and can contribute to enhancing a positive perception of the nighttime environment. It has been past practice in the Downtown Hamilton Community Improvement Project Area to utilize white-light sources. As a result, the Task Force on Safety and Security in the Downtown Core has strongly recommended its use within the project area boundaries for non-residential areas.

Application of Lighting:

Light sources that are considered to be a “white-light” colour spectrum composition and with a high correlated colour temperature shall be utilized for non-residential areas in the Downtown Hamilton Community Improvement Project Area. Lighting levels shall be as prescribed within this policy based upon application.

6. Associated Documents

The following is a list of resource material used in the development of this policy document.

- Transportation Association of Canada – Guide for the Design of Roadway Lighting;
- Transportation Association of Canada – Illumination of Isolated Rural Intersections;
- ANSI/IES RP-8-00 – American National Standard Practice for Roadway Lighting;
- IESNA DG-19-08 – Design Guide for Roundabout Lighting;
- City of Hamilton – Public Works Comprehensive Outdoor Lighting Study

7. Revision History

Revision Number	0 (New Policy)	Revision Date	
Developed By	Mike Field	Title	Project Manager, Street Lighting & Electrical
Approved By	Hart Solomon, P. Eng.	Title	Manager, Traffic Engineering
Signature		Date	
Fiscal Implications?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>		
If 'Yes', approved by		Title	Date

Sidewalk and Roadway Lighting Upgrade Implementation Plan

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1. Objectives and Benefits

The combination of the absence of a comprehensive City sidewalk and roadway lighting policy, and the use of out-dated design practices for lighting has resulted in a wide variety of lighting levels and sub-standard conditions. Past practices, in regards to the design and application of outdoor lighting, is the main contributor to this issue. These practices are nearly exclusively focused upon the needs of roadway lighting, and the benefits related to outdoor lighting (beyond just the roadway) have been generally ignored. In reality, since these benefits have not been realized, the result has been detrimental to topics such as safety, security, accessibility and perception.

In order to address and remediate these issues, a set of objectives has been developed in response. These objectives are summarized as follows:

- Upgrade existing sub-standard sidewalk and roadway lighting infrastructure contained within the public right-of-way to satisfy current standards and practices in relation to their specific applications.
- Upgrade existing sub-standard outdoor lighting conditions specific to the needs of the Downtown Hamilton Community Improvement Project Area as identified within the City’s Comprehensive Outdoor Lighting Study.
- Utilize current material and construction practices to improve the long-term sustainability and reduce the environmental impact of the City’s outdoor lighting infrastructure.

The justification and benefits of outdoor lighting is a complicated subject that is comprised of many factors. In its very basic form, lighting is required to improve visibility during the hours of darkness. Research and study has identified that when appropriately designed lighting is installed, that safety and security (real and perceived) is measurably improved. Additionally, secondary benefits of lighting include, but are not limited to, enhancement of the City’s image, improved commerciality of downtowns, an enhanced feeling of comfort and an increase in public night usage/enjoyment of public spaces. To generalize, adequate outdoor lighting plays a key role in improving the following:

- Pedestrian Safety (Travelling on sidewalks or parallel to roadways)
- Pedestrian-Vehicular safety (Pedestrian road crossings)
- Safety and Security - Real
- Safety and Security - Perceived
- Commercial and City of Hamilton image enhancement
- Vehicular Road Safety (Vehicle-vehicle conflicts)

Therefore, lighting improvements/upgrades to existing deficient installations can directly benefit the aforementioned topics.

2. Implementation Scope

This implementation plan only specifically addresses sidewalk and roadway lighting contained within the public right-of-way. As part of the implementation location/project identification process, lighting upgrade projects, outside of the scope of this implementation plan, may be identified. These other types of lighting upgrade projects can be co-related to the implementation plan objectives and passed to internal or external stakeholders whom would be responsible for planning and execution.

The following provides a summary of the different types of lighting upgrade projects that could be identified as part of the implementation plan process. Additionally, it is indicated as to if the project is contained within the scope or is outside of the scope.

Upgrade Type:	General Description:	Included in scope of implementation plan or not included:
Sidewalks	Lighting of sidewalks or pathways contained within the public right-of-way.	Included
Roadways	Lighting of roadways contained within the public right-of-way.	Included
Alleyways	Lighting of alleyways contained within the public right-of-way.	Included
Walkways	Lighting of walkways connecting roadways to roadways within the public right-of-way.	Included
Parks	Lighting contained within public parks: pathways, playing fields, etc.	Not Included
Parking Lots	Lighting of public or private parking lots (and parking garages).	Not Included
Architectural/Facade	Lighting of public or private building architecture or facades.	Not Included
Monument & Signage	Lighting of monuments or signage (gateways) contained within the public right-of-way.	Not Included

Figure 2.1 – Upgrade Project Scope Summary

As previously described, when lighting upgrade projects that are not included within the implementation scope are identified, these shall be deferred to the appropriate internal or external stakeholders.

3. Existing Sidewalk and Roadway Lighting Conditions

An assessment of the existing sidewalk and roadway lighting conditions in the Downtown Hamilton Community Improvement Project Area was completed as part of the Comprehensive Outdoor Lighting Study. The assessment consisted of physical measurement and estimation (by means of lighting design software) of existing lighting levels. The results were compared against the appropriate lighting standards which therefore specifically identified the locations, quantity and degree of existing lighting deficiencies.

A complete assessment of city wide existing lighting conditions (excluding downtowns as described previously) was not conducted as part of the lighting study. However, a small sample of various different types of roadways (inclusive of sidewalks) was completed. The results of the assessment of this small sampling showed that the majority of both sidewalks and roadways met or exceeded the applicable lighting standards (60% of sidewalks and 66% of roadways met or exceeded the applicable lighting standards).

These results provide background information which was used to develop the implementation policy.

4. Implementation Guiding Principles

The scope and strategy as to where sidewalk and roadway lighting upgrades should be implemented is based upon guiding principles that work in unison to satisfy the implementation objectives and assist in realizing the expected resulting benefits.

These guiding principles are briefly described as follows:

Priority:	Title:	Description:
1	Safety	A demonstrated and proven history of safety related incidences, with a direct or suspected co-relation to sidewalk or roadway lighting playing a key factor in the causes.
2	Deficiency	The analysis of existing sidewalk and roadway lighting conditions in comparison to current applicable standards and practices therefore determining the degree of variation of deficiency.

Figure 4.1 – Guiding Principle Priority Definition

As shown above, safety is the primary guiding principle and deficiency is the secondary principle. In the context of safety, as it has been described, any existing deficient sidewalk or roadway lighting conditions that are directly contributing to a safety related issue will be considered the highest of priority. Existing deficient sidewalk and roadway lighting conditions that safety has not been identified as the primary concern are therefore deemed as a lower priority.

With the exception of the Downtown Hamilton Community Improvement Project Area, the identification of existing deficient sidewalk and roadway lighting condition locations

shall be managed via a responsive methodology. Through a variety of different sources (such as the Hamilton Strategic Road Safety Program – Collision Counter Measures review process, Hamilton Police Service consultation, public request, etc.) each location identified will be comprehensively reviewed from a safety and lighting perspective and prioritized appropriately.

Identification of existing deficient sidewalk and roadway lighting conditions within the Downtown Hamilton Community Improvement Project Area was completed by the Comprehensive Lighting Policy. A progressive methodology can therefore be applied to manage associated lighting upgrades.

In order to prioritize identified locations and to ensure that each one is assessed equally, a formal priority evaluation shall be completed. This evaluation consists of first performing a Transportation Association of Canada (TAC) “Warrant for Lighting” (for the appropriate application – roadway or intersection), a complete review of existing lighting conditions and finally by completing a ‘Sidewalk and Roadway Implementation Priority Evaluation (refer to figure 4.2, pg.6). The Sidewalk and Roadway Implementation Priority Evaluation combines the results of the TAC “Warrant for Lighting” and existing lighting condition data by applying a ‘weighted score’ to each category and assigns a total priority score as a result.

Each individual lighting upgrade project shall be recorded in an implementation project listing (refer to figure 4.3, pg.7). The priority score for each upgrade location shall be utilized to place each identified location into the listing which would be sorted from the highest priority projects to the lowest priority projects. The implementation project listing would be actively updated upon the completion of sidewalk and roadway implementation priority evaluations.

Locations identified in the Downtown Hamilton Community Improvement Project Area are applied an additional ‘weighting’ factor which increases the total priority score. The higher total priority score ensures that these projects are rated at a higher priority within the implementation project listing. The justification for this strategy is that there is a greater need for lighting improvements in the Downtown Hamilton Community Improvement Project Area as it generally has the highest concentration and most deficient lighting conditions within the city. This, in conjunction with ‘progressive; identification management, works with the City’s downtown and community renewal priorities and the Task Force on Security and Cleanliness in the Downtown Core’s objectives.

Figure 4.2



Location Description: Typical Residential Rdwy - Poor Sidewalk Ltg.
Project Number: _____
Date (YY/MM/DD): _____

Sidewalk and Roadway Implementation Priority Evaluation

Item No.	Classification Factor	Rating Factor						Weight "W"	Enter 'R' Here	Score 'R' x W	
		0	1	2	3	4	5				
Lighting Factors (See Note 1)											
<u>Sidewalks</u>											
1	Average to Minimum Horizontal Uniformity Ratio	100%	75-99%	50-74%	25-49%	1-24%	Unlighted	2.0	4	8.00	
2	Maintained Average Horizontal Illuminance	100%	75-99%	50-74%	25-49%	1-24%	Unlighted	1.5	4	6.00	
3	Minimum Maintained Vertical Illuminance	100%	75-99%	50-74%	25-49%	1-24%	Unlighted	0.5	4	2.00	
									Sub-total:	16.00	A
<u>Roadways</u>											
4	Average to Minimum Uniformity Ratio	100%	75-99%	50-74%	25-49%	1-24%	Unlighted	1.5	2	3.00	
5	Average Luminance	100%	75-99%	50-74%	25-49%	1-24%	Unlighted	1.0	2	2.00	
6	Maximum to Minimum Uniformity Ratio	100%	75-99%	50-74%	25-49%	1-24%	Unlighted	0.5	2	1.00	
									Sub-total:	6.00	B
<u>Intersections</u>											
7	Average Luminance	100%	75-99%	50-74%	25-49%	1-24%	Unlighted	2.0		0.00	
8	Average to Minimum Uniformity Ratio	100%	75-99%	50-74%	25-49%	1-24%	Unlighted	3.0		0.00	
9	Maximum to Minimum Uniformity Ratio	100%	75-99%	50-74%	25-49%	1-24%	Unlighted	1.0		0.00	
									Sub-total:	0.00	C
TAC - Applicable Warrant Point Score (Roadway or Intersection) (See Note 2)											
10	Geometric Factors									22.00	
11	Operational Factors									16.65	
12	Environmental Factors									5.06	
13	Collision Factors									5.55	
									Sub-total:	49.26	D
Downtown Hamilton Community Improvement Project Area Factor (See Note 3)											
14	Within Downtown Project Area	No		-		Yes		2.0	0	0.00	E
									(A+B+C+D+E)-50 = Total Priority Score		
									Total Priority Score:		5.07

- Notes:**
- Lighting factors are based upon the degree of deviation from the applicable lighting requirements in comparison to existing conditions. 100% indicates existing conditions meet or exceed required lighting levels, while 1-25% indicate existing condition.
 - TAC Warrant for Lighting Arterial, Collector and Local Roads or Warrant for Intersection Lighting shall be utilized based upon the application and shall be completed as required by the Transportation Association of Canada.
 - Applicable to locations contained within the Downtown Hamilton Community Improvement Project Area boundaries.

5. Planning and Execution

The planning and execution of sidewalk and roadway lighting upgrades will be governed by the implementation project listing as identified in the previous section. Upgrade projects shall be selected from the project list in order of highest priority, mixed in with annual road construction, streetscaping, development (commercial and residential) and other projects initiated for different reasons to lowest priority.

Considering that the implementation project list will be actively updated, there is a high probability that the lowest priority upgrades will remain at the bottom of the list and never, or only after an extended duration, be completed. Low capital cost upgrade projects that have a low priority, such as spot replacements (adding a street lighting luminaire to in-fill existing lighting) shall be reviewed and implemented on an ongoing basis to try to ensure that a satisfactory level of service to the general public is maintained.

Sidewalk and roadway upgrade project locations that are contained within residential neighborhoods (and are not collector or arterial roadways) shall be executed based upon comprehensive public and Ward Councilor consultation. This will work to address some instances, regardless of the benefits and the objectives of the implementation, where lighting upgrades may not be preferred by the local residents.

6. Governance

Currently, sidewalk and roadway lighting (contained within the public right-of-way) capital planning is managed by Public Works – Traffic Engineering. Therefore, Traffic Engineering would be the most suitable to manage and oversee the implementation program. Additionally, Traffic Engineering street lighting capital would provide funding for implementation.

On-going program evaluation, planning guidance and other such activities required to ensure implementation effectiveness would be an on-going process. Consultation with internal and external stakeholders such as Hamilton Police Service and the Task Force on Cleanliness and Safety in the Downtown Core would be utilized by assisting in identifying any further refinement and development required for successful implementation.

In terms of responsibilities, the following is a brief illustration of the implementation governance:

Governance Role:	Description:	Responsibility of:
Location/Project Identification	Identification of ‘potential’ sidewalk and roadway lighting upgrade locations/projects.	Various internal and external sources will identify potential locations/projects. These sources may included, but not limited to, the following: <ul style="list-style-type: none"> • Hamilton Strategic Road Safety Program – CCM • Hamilton Police Service • Ward Councilors • Public • Task Force on Cleanliness and Safety in the Downtown Core

Governance Role:	Description:	Responsibility of:
Upgrade Evaluation and Prioritization	Responsive receipt, evaluation and prioritization of sidewalk and roadway lighting upgrade locations/projects, including maintaining an active implementation project listing.	Public Works – Traffic Engineering
Planning and Design	Selection of projects from the implementation project listing and the engineering and preparation of construction documentation.	Public Works – Traffic Engineering
Capital Funding	Funding for execution (construction) of sidewalk and roadway lighting upgrade projects.	Public Works – Traffic Engineering: street lighting capital
Construction	Execution of sidewalk and roadway lighting upgrade projects.	Street Lighting maintenance contractor (when deemed appropriate) and other electrical contractor as per purchasing policies.

Figure 7.1 – Governance Summary

7. Conclusion

The implementation plan defines how existing deficient sidewalk and roadway lighting conditions are identified, prioritized and provides direction in terms of working towards remediation. In conjunction with the proposed sidewalk and roadway lighting policy, together they serve to assist in setting the standards and defining planning in relation to sidewalk and roadway lighting of public right-of-ways.