Sun/Shadow Study

PURPOSE:

This document provides guidance for the preparation of a Sun/Shadow Study, which may be required for the submission of an application under the *Planning Act*. All Sun/Shadow Studies shall follow the guidelines referenced in this document.

A Sun/Shadow Study includes a visual model and written analysis of the shadow a proposed development will cast. A Sun/Shadow Study demonstrates the impact of development in terms of sun and daylight access to the surrounding context; including surrounding buildings, the public realm, and public open space; and, how the impacts will be mitigated (if applicable).

A Sun/Shadow Study is required in support of a development application composed of buildings greater than 20 meters (6 storeys) in height; evaluating the location, massing, vertical and horizontal articulations, and height of a proposed building. The objective is to maintain quality, comfortable and inviting public spaces and pedestrian environments by demonstrating that a development will not cause undue shade on the subject lands, and on the surrounding context, including building facades, private and public outdoor amenity and open spaces, parkland, school yards and buildings, sidewalks, and other components of the public realm.

The requirement for a Sun/Shadow Study will be identified at the Formal Consultation stage of an application. Staff may request a Sun/Shadow Study for development proposals 20 meters (6 storeys) or less in height based on the existing context and potential impacts on the surrounding area.

PREPARED BY:

A Sun/Shadow Study must be prepared by a consultant registered as a Licensed Architect, Professional Engineer, Registered Professional Planner (RPP), or Licensed Landscape Architect in the province of Ontario. The consultant must affix their stamp and seal and specifically identify the architect, engineer, or planner who prepared the work. The consultant is expected to be experienced in architecture, urban planning, and/or urban design.

CONTENTS:

A pre-study consultation with staff may be required to confirm a terms of reference prior to initiating a Sun/Shadow Study.

1. Technical Criteria

- Dates – Sun/Shadow Studies will be conducted on Winter Solstice (December 21), Spring / Fall Equinox (March / September 21), and Summer Solstice (June 21).
- Times – Sun/Shadow Impact Studies will be conducted at the following times:
  - Solar Noon (SN).
  - Hourly intervals after sunrise and before sunset measured from solar noon as follows:

December 21

9:17 am, 10:17 am, 11:17 am, 12:17 pm (SN), 1:17 pm, 2:17 pm, 3:17 pm

March / September 21

9:12 am, 10:12 am, 11:12 am, 12:12 pm (SN), 1:12 pm, 2:12 pm, 3:12 pm, 4:12 pm, 5:12 pm

June 21

7:21 am, 8:21 am, 9:21 am, 10:21 am, 11:21 am, 12:21 pm, 1:21 pm (SN), 2:21 pm, 3:21 pm, 4:21 pm, 5:21 pm, 6:21 pm, 7:21 pm

- Time Zone – Sun/Shadow Studies will be prepared using the following:
  - Time Zone: Eastern.
  - Standard Time: Universal Time minus 5 hours.
  - Daylight Saving Time: Universal Time minus 4 hours.

- Site Coordinates – Sun/Shadow Studies will be prepared for the following site coordinates:
  - Latitude: N 43 degrees: 14’30”.
  - Longitude: W 79 degrees: 51’00”.

2. Impact Criteria and Considerations

A. Public Realm

This category includes public sidewalks, streetscapes, and public spaces in the boulevard that include patios, sitting areas, turf areas, planting areas and other public realm programs.

- Shadows from a proposed development shall allow for a minimum of 5 hours of continuous sunlight per day on June 21 and March 21 / September 21.

B. Public Spaces and Common Amenity Areas

This category includes public plazas, parks, open spaces, school yards, playgrounds, privately-owned publicly accessible spaces, and common amenity areas that are proposed on-site and exist off-site.

- Shadows impacts from the proposed development shall allow for a minimum of 50% sun coverage in all test times, as measured on June 21 and March 21 / September 21 and;
- Shadow impacts from proposed developments shall not exceed 3 consecutive hours in duration on any portion of the park on June 21 and March 21 / September 21.

C. Residential Private Outdoor Amenity Spaces

Shadow impacts from proposed developments shall not exceed 2 consecutive hours in duration on areas such as private rear yards, gardens, decks, and patios of surrounding residential dwellings on June 21 and March 21 / September 21.

Where shadows already exist on the private amenity space new shadows shall not result in less than 3 hours of direct sunlight. Where less than 3 hours of sunlight already exist on the private amenity space no new shade may be added.

D. Downtown Hamilton Secondary Plan

For developments proposed in the Downtown Hamilton Secondary Plan Area please refer to UHOP Volume 2, Chapter B Public Realm policies 6.1.4.34 to 6.1.4.39 for performance criteria that must be met.

E. Mitigation Measures

Mitigation measures to reduce shadow impacts on shadow sensitive areas include, but are not limited to:

- reduced height;
- alternative massing;
- different building orientation;
- lot consolidation;
- step backs; and,
- slender towers (towers with smaller floorplates).

3. Study Format

A Sun/Shadow Study should include a shadow model and written analysis.

A. The Shadow Model

Images of shadow tests using models that clearly indicate the development site, its boundary, the footprint and mass of buildings within the test site, all streets, sidewalks, public and private open spaces, school yards and buildings, playgrounds, sitting areas, patios, and all properties and buildings affected by shadows within the study area (4.0 times the building height to the north, east and west; 1.5 times the building height to the south).

Shadow models should include the following information:

- Municipal address;
- Type of application;
- The name of the individual and company who has prepared the model;
- North arrow and scale bar;
- All streets, blocks, parks and open spaces, and existing building structures to a distance that shows the shadow impacts during the requested times (at a minimum 4.0 times the building height to the north, east and west; 1.5 times the building height to the south);
- Sidewalks (including boulevards) should be shown from curb side to the edge of the building;
- The as-of-right height and massing – identify the shadow outline which would be cast if the as-of-right height and massing were constructed on the subject lands;
- The proposed building(s) – highlight the site and identify the shadow outline of the proposed building(s). Indicate through a different shade/hatching the area which results in a new net shadow;
- Approved, but not yet constructed – identify proposed development in the study area which have received approval but are not yet constructed, Provide the shadow outline(s) of such buildings only if the shadows which would be cast overlap on the shadow area of the proposed application;
- Developments under construction but not fully built;
- All shadows should be represented using different colours to distinguish between existing shadows and the shade resulting from proposed building(s);
- All images to be displayed in a top view; and,
- 3D mapping showing the shadows from proposed buildings and all buildings within the study area.
- **NOTE -** Shadows from proposed development should be shown fully on the page and not cut off.
- All test times must be provided at a scale that renders the shadows clearly legible in the drawings.

B. Written Analysis

Shadow models must be submitted with a written analysis, which shall include the following:

- Confirmation of site latitude and longitude used in shadow drawings;
- A statement describing how astronomic true north was determined;
- Origin/source of the base plan;
- Description of all locations, uses of areas not meeting the shadow impact criteria (include a key plan for reference);
- Quantification and assessment of the impacted areas that do not meet the

shadow impact criteria;
- Summary outlining how the shadow impact criteria have been met;
- If applicable, detail the proposed measures to be adjusted in the development proposal which will minimize or eliminate the resulting shadow impacts; and,
- Describe any mitigating features that have been incorporated into the site and building design (this may require confirmation through submission of a revised site plan and/or building elevations).
- **NOTE -** A condition of Site Plan Approval will be placed to ensure that the recommendations of the Sun/Shadow Study are fully implemented, prior to the City releasing any associated securities.

OTHER INFORMATION:

Glossary

- As-of-right height and massing: As approved by the existing Official Plan, Secondary Plan or Zoning By-law, whichever provision prevails.
- New net shadow: Highlights the increase in shadow resulting from the proposed development after taking into account the shadow which would be cast form the as-of-right height and massing, the current shadows on the landscape, and any approved but not yet constructed buildings.

3D Mapping

To create 3D mapping showing shadow impacts, existing building information, and building footprints generated from air photos are available on the Hamilton Open Data portal and LiDAR tiles are available on the Ontario Open Data portal. Applicants will need to create their own models of the existing built form.

https://www.hamilton.ca/city-council/data-maps/open-data

City-Wide Corridor Planning Principles and Design Guidelines

https://www.hamilton.ca/build-invest-grow/planning-development/planning-policies-guidelines/city-wide-corridor-planning

Site Plan Guidelines

Site Plan Guidelines | City of Hamilton

Downton Hamilton Tall Buildings Guidelines
https://www.hamilton.ca/build-invest-grow/planning-development/planning-policies-guidelines/urban-design-guidelines

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