

## **ATTACHMENT 1**

Planning and Growth Management Committee Item No. \_\_\_\_ , as adopted by City of Toronto Council on .

### **CITY OF TORONTO**

**Bill No.**

**DRAFT BY-LAW No.**

**To adopt City of Toronto Municipal Code Ch. XXX, Requiring and Governing the Construction of Green Roofs, under s. 108 of the *City of Toronto Act, 2006*, and to make related amendments to Ch. 363 respecting certain fees.**

WHEREAS under section 108 of the *City of Toronto Act, 2006* (the “Act”), the City may pass a by-law requiring and governing the construction of green roofs;

WHEREAS the City wishes to exercise its powers under section 108 of the Act to require green roofs for the purpose of water conservation or energy conservation;

WHEREAS under sections 7 and 8 of the Act and the specific powers and restrictions respecting delegation in sections 20 to 24, the City may delegate its powers and duties under the Act to an officer or employee of the City, including administrative and quasi-judicial powers and legislative powers of a minor nature as provided in section 21; and

WHEREAS under section 366 of the Act, the City may pass by-laws providing that a person who contravenes a by-law of the City passed under this Act is guilty of an offence, and under section 370 may establish a system of fines for offences including special fines, in addition to the regular fine for an offence, that are designed to eliminate or reduce any economic advantage or gain from contravening the by-law;

The Council of the City of Toronto HEREBY ENACTS as follows:

**1.** The City of Toronto Municipal Code is amended by adding the following Chapter:

## Chapter XXX

### REQUIRING AND GOVERNING THE CONSTRUCTION OF GREEN ROOFS

#### ARTICLE I General

##### § XXX-1. Definitions

As used in this Chapter, the following terms shall have the meanings indicated:

**APPLICABLE LAW:** shall have the same meaning as defined in sentence 1.4.1.3(1) of Division A of the Building Code.

**APPLICANT:** means the owner of a building or property who applies for a permit or any person authorized by the owner to apply for a permit on the owner's behalf.

**AVAILABLE ROOF SPACE:** means the total roof area of the building or building addition excluding:

- (a) areas designated for Renewable Energy devices;
- (b) non-vegetative areas as required by the Toronto Green Roof Construction Standard; and
- (c) Private Terraces no greater in area than the floor of the abutting residential unit at the roof level.

**AVERAGE GRADE:** means the average elevation of the ground surface measured at the Street property line.

**BASEMENT:** means the portion of a building between the First Floor and any floor below the First Floor.

**BUILDING CODE, ONTARIO BUILDING CODE OR OBC:** shall all mean or refer to Ontario Regulation 350/06 as amended, under the *Building Code Act, 1992*.

**CHIEF BUILDING OFFICIAL:** means the Chief Building Official and Executive Director, Toronto Building.

**CHIEF PLANNER:** means the Chief Planner and Executive Director, City Planning.

**COMPLETE BUILDING PERMIT APPLICATION:** means an application submitted to the Chief Building Official for an above grade building permit which complies with all

technical requirements of the Building Code Act and includes the payment of all applicable fees.

**DWELLING UNIT:** means living accommodation comprising a single housekeeping unit within any part of a building or structure used, designed or intended to be used by one person or persons living together, in which both culinary and sanitary facilities are provided for the exclusive use of such person or persons, but does not include a room or suite of rooms in a Hotel.

**FIRST FLOOR:** means the floor of a building closest to Average Grade.

**FLOOR PLATE AREA:** means the total area of a floor of a building, measured from the exterior of the main wall of the floor level, including voids at the level of the floor, such as an atrium, mezzanine, stairwell, escalator, elevator, ventilation duct or utility shaft.

**GRADE:** means the finished ground level of the land upon which the building is located.

**GREEN ROOF:** means an extension of an above Grade roof, built on top of a human-made structure, that allows vegetation to grow in a growing medium and which is designed, constructed and maintained in accordance with the Toronto Green Roof Construction Standard.

**GROSS FLOOR AREA:** means the total area of each floor level of a building, above and below Average Grade, measured from the exterior of the main wall of each floor level, including voids at the level of each floor, such as an atrium, mezzanine, stairwell, escalator, elevator, ventilation duct or utility shaft, but excluding areas used for the purpose of parking or loading.

**HEIGHT:** means the vertical distance measured between a horizontal line drawn from the Average Grade to the highest point on the building, but shall not include the following elements located on a Roof of the building:

- (a) equipment used for the functional operation of the building, such as electrical, utility, mechanical and ventilation equipment;
- (b) structures or parts of the building that are used for the functional operation of the building, such as enclosed stairwells, roof access, maintenance equipment storage, elevator shafts, chimneys, vents and water supply facilities;
- (c) structures that enclose, screen or cover the elements listed in (a) and (b) above;
- (d) a flagpole;
- (e) an antenna; and
- (f) a satellite dish,

provided that no part of such element shall exceed a vertical distance of 28 metres measured from Average Grade, and further provided that in the case of the elements

listed in (a), (b) and (c) above, the total area of all of those elements together shall not cover more than 30 percent of the area of the Roof.

**HOTEL:** means a commercial establishment offering temporary accommodations on a daily or weekly rate to the public, and where all rooms, suites, apartments or similar forms of accommodation are owned by a single owner or entity.

**INDUSTRIAL BUILDING:** means a building or a building addition exclusively used or designed or intended for use for or in connection exclusively with the manufacturing, producing or processing of goods, warehousing or bulk storage of goods, self storage facility, distribution centre, truck terminal, research and development in connection with manufacturing, producing or processing of goods, and:

- (a) includes office uses and the sale of commodities to the general public where such uses are accessory to and subordinate to an industrial use,
- (b) does not include:
  - i. a building used exclusively for office or administrative purposes unless it is attached to an industrial building as defined above; or
  - ii. warehouse clubs and retail warehouses, including commercial establishments which have as their principal use the sale of goods and merchandise in a warehouse format.

**NON-PROFIT HOUSING:** means housing which is or is intended to be offered primarily to persons or families of low income on a leasehold or co-operative basis and which is owned or operated by:

- (a) a non-profit corporation being a corporation, no part of the income of which is payable to or otherwise available for the personal benefit of a member or shareholder thereof; or
- (b) a non-profit housing co-operative having the same meaning as in the *Cooperative Corporations Act*.

**NURSING HOME:** a building or portion of a building licensed as a nursing home under the *Nursing Homes Act*.

**PODIUM:** means the base of a building consisting of a base and a tower above the base where the base is two storeys or greater.

**PRIVATE TERRACE:** means outdoor amenity area on a Roof that is available exclusively for use by the occupants of an abutting residential unit for recreational or social activities.

**PUBLIC or SEPARATE SCHOOL:** means premises used for elementary or secondary education regulated and funded under the Education Act, R.S.O. 1990, c. E.2, as amended.

**RENEWABLE ENERGY:** means energy obtained from solar energy or wind energy.

**RESIDENTIAL BUILDING:** means a building or building addition where more than 60 percent of the Gross Floor Area of the building or building addition is used, designed or intended to be used for one or more Dwelling Units, including accessory uses naturally and normally incidental in purpose and exclusively devoted to the residential use, but does not include a Nursing Home, Retirement Home or Lodge, or Hotel.

**RETIREMENT HOME OR LODGE:** a building or portion of a building which provides room and board accommodation for senior citizens and is not presently governed under any Provincial Act.

**ROOF:** means the overhead structural component of a building or a part of a building supported by walls or columns and which functions primarily to shelter the interior of the building from the effects of weather and the infiltration of water.

**SOLAR ENERGY:** means energy from the sun that is converted to produce electrical or thermal energy.

**STOREY:** means the portion of a building, other than a Basement, between any floor level and the floor, ceiling or roof immediately above it.

**STREET:** mean a public highway.

**TORONTO GREEN ROOF CONSTRUCTION STANDARD:** means the minimum mandatory standards for construction of a Green Roof as set out in Article IV of this Chapter.

**TOWER:** means the portion of a building above the Podium of the building, where the tower portion of the building is at least twelve storeys.

**VEGETATION:** means plants selected in accordance with the plant selection criteria of the Toronto Green Roof Construction Standard.

**WIND ENERGY:** means energy from the wind that is converted to produce electrical energy.

**ARTICLE II**  
**Requirement for Green Roofs**

**§ XXX-2. Green Roofs Required**

- A. Every building or building addition constructed after January 30, 2010 with a Gross Floor Area of 5,000 square metres or greater shall include a Green Roof with a coverage of Available Roof Space in accordance with the following chart:

<b>Gross Floor Area (Size of Building)</b>	<b>Coverage of Available Roof Space (Size of Green Roof)</b>
<b>5,000-9,999 m<sup>2</sup></b>	30%
<b>10,000-14,999 m<sup>2</sup></b>	40%
<b>15,000-19,999 m<sup>2</sup></b>	50%
<b>20,000 m<sup>2</sup> or greater</b>	60%

and no person shall construct a Green Roof or cause a Green Roof to be constructed unless a permit therefor has been issued by the Chief Building Official.

- B. Every building or building addition consisting of a Tower above a Podium, where no Storey in the Tower above the Podium level has a floor with a Floor Plate Area exceeding 750 m<sup>2</sup>, shall be permitted to provide the required Green Roof area on Available Roof Space at the Podium Roof level or levels and the Roof area of the Tower shall not be considered as part of the Available Roof Space for a Green Roof.

**§ XXX-3. Maintenance of Green Roofs and Health of Vegetation**

Every Green Roof required to be constructed pursuant to this Chapter shall be maintained in accordance with the maintenance plan required in the Toronto Green Roof Construction Standard.

**§ XXX-4. Permit Required**

- A. No person shall construct, or cause to be constructed, a Green Roof required pursuant to this Chapter unless a permit has been obtained from the Chief Building Official in accordance with the requirements of this Chapter.

- B. No person shall materially alter, or cause to be materially altered, a Green Roof required pursuant to this Chapter unless a permit has been obtained from the Chief Building official in accordance with the requirements of this Chapter.
- C. Where a Green Roof is constructed in conjunction with a building or building addition the Chief Building Official may issue a single permit under section 8 of the *Building Code Act, 1992* for the building or building addition and for the Green Roof.
- D. Where a Green Roof is proposed although not required under this Chapter no person shall construct a Green Roof or cause a Green Roof to be constructed unless a permit has been obtained from the Chief Building Official in accordance with the Toronto Green Roof Construction Standard.

**§ XXX-5. Exemption**

- A. Section XXX-2 does not apply to a building or building addition if a Complete Building Permit Application in accordance with section 8 of the *Building Code Act, 1992* has been submitted for the building or building addition prior to January 31, 2010.
- B. Section XXX-2 does not apply to:
  - 1. a Residential Building with a Height less than 23 metres.
  - 2. a Public or Separate School;
  - 3. an Industrial Building; and
  - 4. Non-Profit Housing.

ARTICLE III  
**Application and Fees**

**§ XXX -6. Application for Approval**

An application for a permit for construction of a Green Roof shall be made to the Chief Building Official on forms, including a “Green Roof Declaration Form”, that may be prescribed by the Chief Building Official from time to time. The “Green Roof Declaration Form” may require information including, but not limited to: structural design; intended use of the Roof and whether or not it will be accessible to the public; and fire safety provisions.

**§ XXX-7. Fees and Charges**

- A. Where an application for a required Green Roof is made in conjunction with an application for a permit for construction of a building or building addition under section 8 of the *Building Code Act, 1992* there shall be no additional fee for the Green Roof.
- B. Where an application for a permit is made for an alteration or renovation to construct a Green Roof, the fee for the application shall be the same as for the building permit classification “Re-Roofing with structural work, raise roof structure” provided in Chapter 363 of the Municipal Code.

ARTICLE IV  
**Toronto Green Roof Construction Standard**

**§ XXX-8. Purpose of Toronto Green Roof Construction Standard: Relation to Ontario Building Code**

- A. The purpose of the Toronto Green Roof Construction Standard is to set out minimum requirements for the construction and maintenance of Green Roofs. The design and construction of a Green Roof shall meet the City’s minimum requirements for Green Roof construction while also meeting the Ontario Building Code (OBC) requirements. The Toronto Green Roof Construction Standard does not replace or alter any existing OBC requirements, or define a singular code compliant Green Roof design.
- B. A designer of a Green Roof shall apply the measures described in this Article with reference to the principles governing the OBC requirements related to each measure.
- C. This Article is considered an acceptable solution for the design and construction of a Green Roof in addition to the acceptable solutions contained in parts 3 to 12, Division B, of the OBC. Designs shall meet the OBC objectives to demonstrate compliance with the OBC; however a design that complies with the provisions of § XXX-9 shall be deemed to comply to such objectives.
- D. A Green Roof designed to the Toronto Green Roof Construction Standard may be constructed on both combustible and non-combustible buildings.



## § XXX-9. Toronto Green Roof Construction Standard: Mandatory Provisions

The following standards shall be met in the design and construction of a Green Roof:

### A. Green Roof Assembly

A Green Roof assembly shall, as a minimum, consist of a root repellent system, a drainage system, a filtering layer, a growing medium and plants, and shall be installed on a waterproof membrane of an applicable Roof.

### B. Gravity Loads

1. The Applicant shall calculate Green Roof gravity loads following the protocol provided by the ASTM standard: “ASTM E2397.05 – Standard Practice for Determination of Dead Loads and Live Loads Associated with Green Roof Systems”.

2. The density of the growing media shall be determined

(a) in accordance with “ASTM E2399.05 – Standard Test Method for Maximum Media Density for Dead Load Analysis of Green Roof Systems”; or alternatively

(b) the designer may use an un-factored, saturated density of the growing media of 2,000 Kg/m<sup>3</sup>.

3. The Applicant shall include design loads definition as part of the “Green Roof Declaration” form which shall be required as part of an application for Building Permit.

### C. Slope Stability

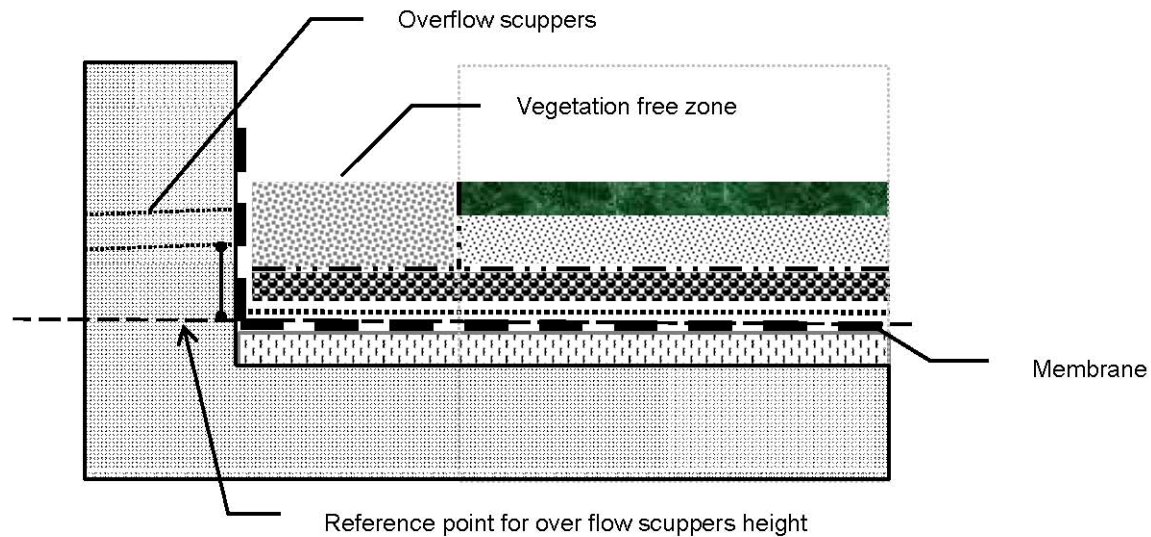
All roofs with slopes in excess of 10° (17%) that support Green Roof assemblies shall incorporate anti-shear measures.

### D. Parapet Height and/or Overflow Scupper Locations

1. Parapets and scuppers shall be specified in the design, as required, to limit retained rain water loads to within structural limits in the event of obstructed internal drains.

2. Analysis shall be done in conformance with OBC Division B 4.1.6.4.(4)

3. The referenced point for the overflow scuppers height must be clearly indicated to avoid the possibility of confusing the overflow scupper height as being measured above the finished green surface or other layer above the waterproofing resulting in higher water load than accounted for by the design as indicated in the sketch below.



E. Wind Uplift

The Applicant shall provide a report, stamped by an engineer, providing wind uplift pressures being designed for (including a description of how the pressures were determined), and describing how the design addresses these pressures.

F. Fire Safety

Where roof penetrations, intersecting walls, parapets, upturns or mechanical equipment are clad with combustible materials the design shall include a vegetation-free border zone abutting such features and the vegetation-free border shall be equal to the vegetation height at maturity but in no case be less than 0.5 m.

G. Occupancy and Safety

The Applicant shall state, in a Green Roof declaration form and the Green Roof application, the use of the roof and whether or not it will be accessible to the public.

H. Waterproofing

1. The design and construction shall include the installation of a root barrier in all vegetated roofing systems.
2. Immediately prior to installation of the Green Roof, the Applicant shall cause to be conducted one of the following leakage testing protocols:
  - a) Flood Test,
  - b) Electric Field vector mapping,
  - c) Impedance Test,
  - d) Infrared (IR) Thermal Imaging,
  - e) Low Voltage Testing,
  - f) High Voltage Testing,
  - h) Moisture Sensorsand a report documenting a successful test, signed by an architect or engineer, shall be provided to the Chief Building Official:

I. Drainage

1. The design hydraulic load shall be evaluated assuming that the green roof system is fully saturated prior to the maximum 15 minute rainfall.
2. Positive slope to drain shall be provided at the level of the waterproofing membrane.
3. The system shall permit effective drainage beneath the growth media.
4. Vegetation-free zones shall be provided around all drains.

J. Water Retention

1. Water retention mats or equivalent materials shall be employed as required to promote vegetation growth.
2. The drainage layer shall be appropriate for storm water retention and must be selected following “ASTM E2398-05 Standard Test Method for Water Capture and Media Retention of Geo-composite Drain Layers for Green Roof Systems”.

K. Vegetation Performance

In order to support plant survivability:

1. When structurally possible, the growing media shall be at a minimum 100mm, or
2. the Applicant shall provide a report confirming that the engineered system as designed provides plant survivability comparable to that of an un-irrigated system with growing media at minimum 100mm.

L. Plant Selection

1. Vegetation on a green roof shall not include any noxious weeds as defined in Ontario Regulation 1096 under the *Weed Control Act*, as may be amended from time to time.
2. The plant selection and design shall be such that within three years of the planting date the selected plants shall cover no less than 80% of the vegetated roof.
3. Compliance with the plant coverage required in the preceding sentence can be satisfied by a design that will provide one or more of the following:
  - a) that seeds for groundcover plantings shall be sown at a rate not less than 325/m<sup>2</sup>,
  - b) that cuttings shall be distributed not less than 12kg/100m<sup>2</sup>, and
  - c) either that pre-grown plugs shall be installed not less than 11/m<sup>2</sup> or a report from the designer that describes how the design fulfills this coverage requirement shall be provided with the application.

M. Irrigation

Adequate measures shall be provided to permit irrigation necessary to initiate and sustain the vegetation during the service life of the Green Roof.

N. Maintenance Plan

1. The Applicant shall develop a maintenance plan for the Green Roof as per CSA-S478-95 “Guideline on Durability in Buildings” which shall define programs of routine maintenance and inspection sufficient to ensure that the Green Roof components perform their required functions for the duration of their design service lives.
2. The maintenance plan shall address the requirements of the specified growth media and vegetation for vegetation survival.
3. The maintenance plan shall address re-planting, in the event that re-planting should become necessary, and assure that complete coverage at canopy level is achieved within three growing seasons and maintained for the service life of the Green Roof.
4. The maintenance plan shall be submitted with the application for a permit for a Green Roof.

ARTICLE V  
**Approval of Application**

**§ XXX-10. Approval by Chief Building Official**

The Chief Building Official shall approve an application for construction of a Green Roof that conforms to this Chapter by issuing a permit in accordance with section 8 of the *Building Code Act, 1992* in conjunction with an application for construction of a building or structure that includes a Green Roof.

**§ XXX-11. Variation of Coverage Requirement for a Green Roof by the Chief Planner and Exemption by City Council**

- A. If an Applicant is unable to provide the Green Roof coverage as required in this Chapter, application may be made to the Chief Planner to provide a smaller Green Roof area than would otherwise be required provided that a cash-in-lieu payment is made in accordance with this Chapter.
- B. Where an Applicant seeks a complete exemption from the Green Roof requirement of this Chapter, the Applicant may apply to City Council to be exempted from the requirement.
- C. Where an application for a reduced Green Roof requirement is made to the Chief Planner pursuant to subsection A, no alteration or variance to the technical standards for construction of Green Roofs as provided in the Toronto Green Roofs Construction Standard shall be permitted.

- D. Where an application for a complete exemption from a required Green Roof is made to City Council, the Chief Planner shall report to the appropriate Community Council and that Community Council shall consider the application and shall recommend to City Council whether to refuse or approve the application.
- E. City Council may refuse the application or approve the application for exemption, and where City Council allows an exemption, the Chief Building Official may issue a permit for the related building or building addition as though the Applicant was in compliance with this Chapter.

**§ XXX-12. Cash-in-Lieu of Construction of a Green Roof**

- A. Where less than the required Green Roof coverage than otherwise would be required by this Chapter is provided, either because of a variance approved by the Chief Planner, or an exemption approved by City Council, the Applicant shall make a payment of cash-in-lieu of construction of a Green Roof for the reduced area based on the average actual cost of construction of a Green Roof which at the time of passing of this Chapter shall be deemed to be \$200.00/m<sup>2</sup>.
- B. The Chief Planner shall from time to time, and at least bi-annually report to City Council on the cost of construction for a Green Roof and shall recommend changes to the base sum in subsection A to ensure that it reflects the prevailing average actual cost of construction of a Green Roof.
- C. All of the funds collected as cash-in-lieu of construction of a Green Roof shall be segregated and directed to the Eco-Roof Incentive Program of the City for the provision of Green Roofs on exiting buildings.

ARTICLE VI  
**Green Roof Technical Advisory Group**

**§ XXX-13. Green Roof Technical Advisory Group.**

- A. The Chief Building Official shall appoint a chair and ten members of the Green Roof Technical Advisory Group.
- B. The chair and members of the Green Roof Technical Advisory Group shall be appointed for a term of three years, and may be re-appointed for an additional term of three years.

- C. The Office of the Chief Building Official shall provide staff support, including secretariat duties, for the Green Roof Technical Advisory Group.

**§ XXX-14. Qualifications for Chair and Members of the Green Roof Technical Advisory Group.**

- A. Persons appointed as the chair or as a member of the Green Roof Technical Advisory Group shall possess expert knowledge and professional qualification concerning Green Roof technology and have a working familiarity with the building code.
- B. Membership in the Green Roof Technical Advisory Group shall be representative of various sectors including the following:
1. Enforcement of regulations and administration of the building code sector including but not limited to members from staff of Toronto Building and the Building and Development Branch of the Ministry of Municipal Affairs;
  2. Design sector;
  3. Material and component manufacturers and suppliers sector;
  4. Construction sector;
  5. Research sector including but not limited to persons involved in Green Roof research and testing in an professional academic institution, school of engineering or architecture; and
  6. Green Roof Industry sector being individuals working in the Green Roof industry.

**§ XXX-15. Purpose of the Green Roof Technical Advisory Group.**

- A. The Green Roof Technical Advisory Group shall make recommendations for consideration by the Chief Building Official with respect to:
1. technical issues relating to the creation, implementation and development of the City of Toronto Green Roof Construction Standard;
  2. possible amendments to the Toronto Green Roof Construction Standard; and

3. take part in periodic review of the Toronto Green Roof Construction Standard.

**§ XXX-16. Recommendations of the Green Roof Technical Advisory Group.**

- A. The Green Roof Technical Advisory Group shall consider and comment upon the following matters in making recommendations for consideration by the Chief Building Official:
  1. policy directions from City Council related to requiring and constructing Green Roofs;
  2. the City's Green Roof strategy as expressed in the document "Making Green Roofs Happen",
  3. consultations with stakeholders from government, industry, and the community at large;
  4. technical viability of existing or proposed standards for Green Roofs;
  5. consistency of the Green Roof standards with objectives of the building code;
  6. impacts of the Green Roof standard on the interests of stakeholders and the economic feasibility of the recommendation; and
  7. the enforceability of the recommendation if implemented as part of the Green Roof standard.

**§ XXX-17. Meetings of the Green Roof Technical Advisory Group.**

- A. The Green Roof Technical Advisory Group shall meet at the call of the Chief Building Official and the meeting shall consider the matters set out in a meeting agenda prepared by Toronto Building staff.



ARTICLE VII  
**Changes to the Technical Standards**

**§ XXX-18. Changes to Technical Standards**

- A. The Chief Building Official shall periodically review the Toronto Green Roof Construction Standard and, after consultation with the Green Roof Technical Advisory Group, recommend amendments to City Council to reflect the City's experience with Green Roofs and new construction techniques and materials.

ARTICLE VII  
**Chief Building Official to Publish Guideline**

**§ XXX-19. Chief Building Official to Publish Guideline**

- A. The Chief Building Official shall, after consulting with the Green Roof Technical Advisory Group, periodically develop and publish Green Roof Construction Guidelines and Best Practices to assist designers and others to design and construct Green Roofs in accordance with the Toronto Green Roof Construction Standard.

ARTICLE VIII  
**Miscellaneous**

**§ XXX-20. Offences**

- A. Every person who contravenes a provision of this Chapter is guilty of an offence.
- B. Every director or officer of a corporation who knowingly concurs in a contravention of this Chapter by the corporation is guilty of an offence.
- C. Every person who fails to comply with a term or condition of a Green Roof permit under this Chapter is guilty of an offence.
- D. Every person who contravenes an order under subsection 384(1) or 385(1) of the *City of Toronto Act, 2006*, is guilty of an offence.

**§ XXX-21. Penalty.**

Every person convicted of an offence under this Chapter is liable to a maximum fine of not more than \$100,000.

ENACTED AND PASSED this    day of, A.D. 2009.

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Mayor

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City Clerk