

Green Roofs Infrastructure - Demonstration Project

(City Council on May 9, 10 and 11, 2000, amended this Clause by striking out and referring the following portion of the recommendation of the Administration Committee back to the Administration Committee for further consideration, together with the report dated May 8, 2000, from the Chief Financial Officer and Treasurer:

“and further, that the proposal to demonstrate green roof infrastructure technology on the City Hall podium roof as described in the aforementioned report be approved, subject to the following conditions:

- (a) that City Council amend the 2000-2004 Capital Budget to provide \$165,000.00 in funding to repair a portion of the City Hall podium roof in 2000 rather than 2004 as provided in the Capital Budget; and*
- (b) that the additional funds required to implement the City Hall podium roof demonstration project as outlined in the aforementioned report (approximately \$135,000.00) be secured from the Toronto Atmospheric Fund, the Green Roofs for Healthy Cities Coalition, the federal government, or other funding sources, before the City Hall podium green roof project proceeds.”)*

The Administration Committee recommends the adoption of the report (March 28, 2000) from the Commissioner of Corporate Services; and further, that the proposal to demonstrate green roof infrastructure technology on the City Hall podium roof as described in the aforementioned report be approved subject to the following conditions:

- (a) that City Council amend the 2000-2004 Capital Budget to provide \$165,000.00 in funding to repair a portion of the City Hall podium roof in 2000 rather than 2004 as approved in the Capital Budget; and**
- (b) that the additional funds required to implement the City Hall podium roof demonstration project as outlined in the aforementioned report (approximately \$135,000.00) be secured from the Toronto Atmospheric Fund, the Green Roofs for Healthy Cities Coalition, the Federal Government, or other funding sources before the City Hall podium green roof project proceed.**

The Administration Committee reports, for the information of Council, having requested the Chief Financial Officer and Treasurer to submit a report directly to Council for its meeting scheduled to be held on May 9, 2000, respecting the foregoing funding proposal.

The Administration Committee submits the following report (March 28, 2000) from the Commissioner of Corporate Services:

Purpose:

To report back to the Administration Committee as requested on the concept and proposal suggested by the Green Roofs for Healthy Cities Coalition and to receive approval to proceed with a green roof infrastructure demonstration and monitoring project.

Financial Implications and Impact Statement:

The green roof demonstration projects will be completed within current capital and operating budgets along with committed donations and grants.

The Chief Financial Officer and Treasurer has reviewed this report and concurs with the financial impact statement.

Recommendations:

It is recommended that:

- (1) the proposal to demonstrate green roof infrastructure technology at Eastview Neighbourhood Community Centre, as described in this report, be approved;
- (2) City staff continue to work with the Green Roofs for Healthy Cities Coalition in the development, installation and monitoring of a green roof at the Eastview Neighbourhood Community Centre, as described in this report;
- (3) City staff continue to work with the Green Roofs for Healthy Cities Coalition and other stakeholders to develop a green roof demonstration on the podium roof at City Hall, and
- (4) the appropriate City officials be authorized and directed to take the necessary action to give effect thereto.

Background:

By adoption of Report No. 1 of the Administration Committee by Council on July 6, 1999, Council endorsed, in principle, the concept of a green roof at Toronto City Hall and requested the Acting Commissioner of Corporate Services to submit a report to the Administration Committee on the concept as proposed by the Green Roofs for Healthy Cities Coalition.

The establishment of green roofs has also been recommended in the Environmental Task Force's (ETF) Proposed Environmental Plan to promote sustainability. Further, City Council also adopted a report from the Board of Health which directed the Toronto Atmospheric Fund (TAF) to analyze the Toronto "Urban Heat Island Effect" and to identify methods to mitigate summer heat over the long term, such as enhancing the urban forest, promoting green rooftops and gardens. Similarly, on May 13 and 14, 1998 City Council adopted a smog prevention and reduction strategy for the new City of Toronto which recommends, in principle, investments in initiatives such as green roofs and strategic planting to reduce the urban heat island effect.

This report has been reviewed by the Toronto Interdepartmental Environment Team (TIE) and received very favourable feedback.

Based on experience in other jurisdictions, such as the City of Chicago, which is implementing a \$1.0 million green roof demonstration project this spring at their City Hall, green roofs have multiple benefits for the City. Climate change benefits include both greenhouse gas mitigation and adaptation needs in cities. Mitigation stems from: reducing energy consumption related to heating and cooling due to added insulation values on the roof, the evapotranspiration from the plants and carbon sequestration. Adaptation relates to a reduction of the urban heat island effect by dramatically reducing the temperatures on roofs leading in turn to reductions in smog. Adaptation also involves improved storm water management involving better retention and improved water quality. Other benefits from green roof infrastructure include increased roof membrane life expectancy, reduction of particulate matter in the air, reduction of smog precursors, increased amenity/recreation space in the downtown core, urban food production opportunities, noise reduction and improved aesthetics.

Comments:

Following Council's adoption of Report No. 1 of the Administration Committee, the Green Roofs for Healthy Cities Coalition applied to the Toronto Atmospheric Fund (TAF) for funding in order to prepare a study to determine the feasibility of undertaking demonstration projects involving one or more City of Toronto facilities, one being Toronto City Hall.

TAF granted the Green Roofs for Healthy Cities Coalition \$6,500.00 in support of a Phase I Feasibility Study of the Green Roof Infrastructure Demonstration and Monitoring Project. At the same time, the Coalition applied with the National Research Council and Environment Canada to the Federal Government's Technology for Early Action Measures (TEAM) for funding to quantify, monitor, and analyze the various aspects of rooftop garden infrastructure. Coalition members also pledged in-kind contributions towards preliminary work and the eventual construction of the proposed demonstration projects totaling \$105,000.00. The National Research Council's Institute for Research in Construction, and Environment Canada's Adaptation and Impacts Research Group have also partnered with the Coalition in order to contribute to the implementation and monitoring of the demonstration projects. The University of Toronto would like to use the garden as part of a summer field course on City Hall to determine the suitability of plants, shrubs, etc. on roofs in the Toronto climate. Phase II of the project will be the actual implementation and Phase III will include the education and monitoring of the green roofs.

Given the many possible benefits of green roof infrastructure, a multi-stakeholder steering committee was formed to assist in the design of the demonstration project (see appendix A for list of members on the steering committee). After reviewing several sites, the steering committee agreed that both City Hall and the Eastview Neighbourhood Community Centre would be good candidates as demonstration sites. The characteristics of these two sites provide opportunities to demonstrate, both, an accessible, intensive, high-profile application, and an inaccessible, extensive, research-oriented application respectively.

Eastview Neighbourhood Community Centre Demonstration Site – Pilot Project:

The proposed Eastview Community Centre demonstration site is approximately 5,000 square feet in size. The roof construction at this site is considered to be typical of a large class of buildings in the Toronto area. It is at this location that the National Research Council plans to install sensors and monitoring equipment. If approved, The Federal Government's Technology for Early Action Measures Program (TEAM) along with the National Research Council and Environment Canada will provide funding and in-kind support of up to \$420,000.00 to study and model various aspects of green roof technologies including the benefits of green roofs with respect to energy efficiency, storm water retention and quality, the extension of roof membrane life span and modeling of the urban heat island effect. The monitoring phase will continue over a three year period. The Institute for Construction Research will also develop green roof industry design specifications as part of this project. The first step of the approval process was successfully completed in February 2000 and the final step for approval is in April 2000.

The approved 2000 capital program includes an allocation of \$285,000.00 for roof replacement at Eastview Community Centre. Based on a quotation received through the Coalition's roofing contractor Flynn Canada Ltd., both the roof and the green roof can be incorporated into the approved roof replacement project. In order to facilitate and coordinate the demonstration portion of this project including the monitoring aspects, it is recommended that the green roof and roof replacement work be completed in partnership with the Coalition. The Coalition's roofing contractor has had experience handling the roof membrane specified and the other green roof components. Facilities' staff have reviewed the quotation and are confident that the price is fair and that contractor can complete the work satisfactorily. The usual City requirements as to bonding, insurance, fair wage will be applied to this project.

The Executive Director of the Centre is very supportive of the project.

City Hall Demonstration Site:

The proposed City Hall demonstration site on the podium roof is approximately 6,000 square feet in size. In addition to the previously mentioned environmental benefits, this site would serve as an excellent "on the ground" educational resource for understanding and learning about green roof technology. The green roof could also provide valuable amenity space for the occupants of City Hall, surrounding buildings, and the general public. It would involve replacing a section of the existing roofing system (all of which is scheduled to be replaced in 2004) with a green roof system.

Since there are plans to redevelop Nathan Philips Square in the near future it is recommended that a green roof be considered to be part of this redevelopment and be included as a potential element in the design competition. In the meantime it would be beneficial to design a green roof pilot project for the City Hall podium roof that would be considered to temporary in nature and which could eventually be tied into the overall program at City Hall.

The Coalition will continue to work with City staff to prepare an acceptable design. The total cost to incorporate a roof top garden with replacement roofing on the podium at City Hall has been estimated to be \$295,000.00 of which \$130,000.00 is for the green roof system and \$165,000.00 is for the re-roofing (the re-roofing of the entire podium roof is scheduled for

2004). While some funding is available from the Coalition and possibly TAF and the Federal Government for this project, additional funding partners will have to be found before this project can become a reality.

Conclusions:

The City has adopted green roof technology in principle. An opportunity now exists to demonstrate this technology, not in isolation, but with various stakeholders and funding partners. It is recommended that the City proceed with these demonstration projects, monitor the results and continue to network with stakeholders in order to assess the opportunities to expand the green roof infrastructure technology throughout the City.

Both of the recommended demonstration sites are suitable for a green roof in regards to structural requirements. The limited accessibility at Eastview Community Centre suits the demonstration nature of the green roof at this site. Accessibility issues will have to be resolved at City Hall since access to the podium roof is currently restricted. Green roof maintenance is most intensive in the initial stages and is minimal once the green roof is established. Two years of complete maintenance has been included in the green roof costs.

The City of Toronto has by far the largest market potential in Canada for green roof infrastructure. In the City of Toronto alone there were over 33,438,414 m² of roofs of buildings that have over 100 m² of roofing, excluding most residential units (NRCan. 1986). Green Roofs for Healthy Cities is focusing its efforts to create a new green roof infrastructure industry in Toronto due to the size and potential of the market, and because the City of Toronto has made firm commitments to reduce greenhouse gases, smog precursors and to promote environmentally sustainable technological developments.

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Appendix A

Green Roof Steering Committee:

Co-Chairs: S. Peck, Green Roofs for Healthy Cities and J. Kamstra, Facilities and Real Estate

Participants:

A. Beauregard, Parks and Recreation Division;
L. Salsberg, S. Rodriguez, Strategic and Corporate Policy, CAO's Office;
B. Baskaran, National Research Council, Institute for Research in Construction;
Dr. B. Bass, Environment Canada, Impacts and Adaptation Research Group;

D. Stonehouse, Urban Planning and Development Services;
L. Corbett, Toronto Environmental Alliance;
M. Campbell, Toronto Public Health;
R. Morris, Energy Efficiency Office;
M. Kuhn, Rooftop Garden Resource Group;
P. Georgopolus, Stormwater Management, Works Department;
J. McFadyen, Facilities and Real Estate;
D. O'hara, Parks and Recreation; and
R. Stromberg/L. Cap, Heritage Toronto.

The Administration Committee reports, for the information of Council, having also had before it a publication entitled "The Green Roof Infrastructure Monitor".

Mr. Steven Peck, Green Roofs for Healthy Cities Coalition, appeared before the Administration Committee in connection with the foregoing matter.

(City Council on May 9, 10 and 11, 2000, had before it, during consideration of the foregoing Clause, the following report (May 8, 2000) from the Chief Financial Officer and Treasurer:

Purpose:

The purpose of this report is to respond to the request by the Administration Committee on April 25, 2000, regarding funding for a second Green Roof demonstration project located on the City Hall podium.

Financial Implications and Impact Statement:

The proposed project requires net City funding of \$165,000 and was not included in the 2000 Capital Budget, as adopted by Council. This request would amend the Capital Budget for 2000 by the addition of a 2000 sub-project for \$300,000 gross and \$165,000 net for the structural re-roofing of the City Hall podium, with \$135,000 to be provided from the Toronto Atmospheric Fund (TAF) and the Green Roofs for Healthy Cities Coalition for the green roof system. This project was included for approval in 2004 and if accelerated to 2000, it would add debt charges of \$24,000 per year for four years and would similarly reduce funding requirements after 2010, as that portion of the roof would have been replaced earlier.

Recommendations:

It is recommended that:

- (1) the request to add a \$300,000 gross, \$165,000 net sub-project for the Green Roof demonstration on the City Hall podium be considered in the 2001 Capital Budget process; and*

- (2) *this report be received for information.*

Background:

On April 25, 2000, the Administration Committee had before it a report (March 28, 2000) from the Commissioner of Corporate Services, reporting as requested by the Administration Committee, on the concept and proposal suggested by the Green Roofs for Healthy Cities Coalition; recommending that:

- (1) *the proposal to demonstrate green roof infrastructure technology at Eastview Neighbourhood Community Centre, as described in this report, be approved;*
- (2) *City staff continue to work with the Green Roofs for Healthy Cities Coalition in the development, installation and monitoring of a green roof at the Eastview Neighbourhood Community Centre, as described in this report;*
- (3) *City staff continue to work with the Green Roofs for Healthy Cities Coalition and other stakeholders to develop a green roof demonstration on the podium roof at City Hall, and*
- (4) *the appropriate City officials be authorized and directed to take the necessary action to give effect thereto.*

The Administration Committee also had before it a publication entitled "The Green Roof Infrastructure Monitor". Mr. Steven Peck, representing the Green Roofs for Healthy Cities Coalition, appeared as a deputant.

The Administration Committee:

- (1) *recommended to Council the adoption of the report (March 28, 2000) from the Commissioner of Corporate Services; and further, that the proposal to demonstrate green roof infrastructure technology on the City Hall podium roof as described in the aforementioned report be approved subject to the following conditions:*
 - (a) *that City Council amend the 2000-2004 Capital Budget to provide \$165,000.00 in funding to repair a portion of the City Hall podium roof in 2000 rather than 2004 as approved in the Capital Budget; and*
 - (b) *that the additional funds required to implement the City Hall podium roof demonstration project as outlined in the aforementioned report (approximately \$135,000.00) be secured from the Toronto Atmospheric Fund, the Green Roofs for Healthy Cities Coalition, the Federal Government, or other funding sources before the City Hall podium green roof project proceed; and*

- (2) *requested the Chief Financial Officer and Treasurer to submit a report directly to Council for its meeting scheduled to be held on May 9, 2000, respecting the foregoing funding proposal outlined in the aforementioned Committee Recommendation.*

Comments:

The Eastview Neighborhood Community Centre re-roofing sub-project of \$285,000 is funded in the 2000 Capital Budget, and additional funding for the study and ongoing monitoring of the green roof system is to be raised from outside sources. The 2000-2004 Capital Program includes a projected \$1.2 million sub-project to replace the City Hall podium roof membrane in 2004. This sub-project was received by Council as part of the 2000-2004 Capital Program of Facilities and Real Estate; thus, it is shown as part of future plans, rather than an approved and funded item. The current availability of Federal Government money for such demonstration projects and the attractiveness of the two green roof projects for obtaining funding were significant factors in the Administration Committee's recommendation to move the City Hall podium project to 2000.

This proposal entails an early replacement of a portion of the City Hall podium roof with a new roof membrane and a demonstration garden or green roof. When the planned redesign of Nathan Phillips Square occurs, the horticultural portion of the proposed projects could be changed, although the roofing portion would be permanent.

The replacement of the balance of the City Hall podium roof remains in the plan capital program for 2004. The Green Roof Demonstration Project at Eastview Neighbourhood Community Centre is funded this year and includes monitoring and evaluation of the technology involved with green roofs. However, there is an interest in demonstrating Green Roof technology in a more public location; thus the request to move this partial replacement of the podium roof into the current year.

The request for 2000 funding for this sub-project would require additional debt financing of \$165,000 and corresponding debt charges of \$24,000 per year to be added to the 2000 Capital Budget as it cannot be accommodated by transfer from other approved 2000 roofing sub-projects. The current Council protocol in dealing with in-year changes requires the referral to the Policy and Finance Committee. The project should be considered as part of the 2001 Capital Budget process, as it is not of an urgent nature.

Conclusions:

The request for additional Capital Budget funding of \$300,000 gross and \$165,000 net for a partial green roof demonstration project on the City Hall podium roof should be referred to the 2001 Capital Budget process. The decision to allocate funds to this project will result in a reduction of \$165,000 from the \$1.2 million projected for replacement of the podium roof in 2004.

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