

CONTENTS

PART ONE SECTION 9 ENVIRONMENT

- 1.1 University Policy
- 1.2 Environment in the Design & Approval Process
- 1.3 Specific Requirements
 - .1 Minimize Energy Use
 - .2 Minimize Water Use
 - .3 Material Choice
 - .4 Effluents & Emissions
 - .5 Outdoor Environment
 - .6 Waste Management
 - .7 Monitoring
 - .8 Check List

ENVIRONMENT

1.1 UNIVERSITY POLICY

The University's strongly expressed desire to institute and maintain exemplary strategies aimed at enhancing the campus and global environment is set out in its Environmental Protection Policy dated March 7, 1994. (attached, Part 1 Section 9 Environment Appendix A).

This policy has had, and will have, increasingly important ramifications for University construction on many levels, from siting policy to material selection. No one underestimates the difficulties of making the most effective environmental choices nor can the budget implications of such choices be ignored, but buildings represent the most important single element affecting our environment - not only by actually giving it its recognizable form but also by their consumption of natural resources in construction, servicing, maintenance and disposal, and all the building professions have a particular responsibility to foster good environmental practices.

One of the complicating factors in making optimum environmental decisions is that such decisions routinely involve a simultaneous assessment of a variety of factors dealt with by different consultants and trades, for example: the most effective energy saving strategy might easily involve siting, aspect, wall construction, window type and mechanical services. Under these conditions it is imperative that each of the consulting and trade sectors be prepared both to innovate in its own field and to seek optimum solutions through dialogue with other sectors. The architectural consultants will normally bear the overall responsibility for co-ordinating such efforts.

1.2 ENVIRONMENT IN THE DESIGN AND APPROVAL PROCESS

The University will be involved in decisions that have significant environmental implications. Selection of architects and other consultants for University of Toronto building projects will depend, in part, upon their understanding and experience of environmental issues.

Architects and other consultants will follow the following environmental design principles:

- .1 When making decision about designs, processes and products that influence resource use (e.g. energy, water, materials) and other environmental impacts (e.g. indoor air, waste management), alternative choices, including innovative but proven alternatives, are to be considered.
- .2 *Change* is a constant in University life, as elsewhere. Designs which facilitate future changes and which minimize the potential environmental impacts of demolition and renovation are preferable. (e.g. see Material Choice).
- .3 Preference will normally to be given to choices which minimize the life-cycle costs but those which offer greater environmental benefits than those with the lowest life-cycle cost should also be presented for consideration by the University.
- .4 *Environmental impact* must be assessed broadly - impact in one area must be assessed in relation to others so that the "system" as a whole can be seen to be effective.

Below are specific requirements concerning the environment that architects and other consultants are expected to follow. Through these the University hopes to achieve its

environmental objectives. Some, however, may present new challenges to architects and consultants and may not be possible for certain projects. As a way of informing the University about the degree to which these guidelines and requirements can be met on each project, the architect and other consultants must complete and submit the attached Environmental Design Standards check list with accompanying explanations.

1.3 **SPECIFIC REQUIREMENTS**

1.3.1 **MINIMIZE ENERGY USE**

.1 Selection:

Energy efficiency must be considered on a system basis. The most efficient energy production method - ideally non-polluting, using renewable resources and with long-term potential - should be used.

.2 University Systems:

The energy use of individual projects must be considered in the light of the University-wide heating and cooling systems and a decision to use them (or not) should be subject to the same scrutiny as noted above.

.3 Equipment:

High priority must be given to energy efficiency in the selection of all mechanical and electrical devices such as high-efficiency electric motors with minimum power factor.

.4 Heating, Cooling & Ventilating:

Building design should maximize the use of natural energy. This should include the use and control of sunlight: maximum solar access through well-located efficient windows in winter, shading by deciduous landscape materials or built shades in the summer.

Simple methods of personal control of indoor environment - e.g. opening windows, - should be applied wherever possible. This proposition should, like all others be evaluated in related contexts such as safety and security.

Mechanical devices should be used only where necessary and where the use of low energy or passive systems are impractical.

.5 Lighting:

Natural daylight should be utilized for task lighting whenever possible. Sizable, well-placed windows will be important. For additional artificial lighting, low energy fixtures should be used. Lighting should be of a comfortable level which discourages the use of artificial lighting. The aim being the lowest level of energy use in combination with comfort.

1.3.2 **MINIMIZE WATER USE**

Ultimately, minimizing water use will depend heavily on the responsibility of individual users. The building design, however, can influence this use in a number of ways:

- .1 Water saving fixtures should be installed wherever possible.

- .2 The re-use of water for useful purposes should be encouraged. For example, rain water and treated “grey” water can be used for some building and landscape purposes.
- .3 The use of fresh water for cleaning purposes should also be minimized by the choice of material surfaces, or by water recycling systems.
- .4 Water used to cool equipment including research equipment should be minimized through the use of close looped system.

1.3.3 MATERIAL CHOICE

- .1 Products and building processes to be applied to University building projects should be benign. Assessment of such things is complex, but ideally the environmental consequences of all aspects of products’ life cycle need to be considered including:
 - Extraction
 - Transportation
 - Manufacture
 - Erection or Fabrication
 - Use
 - Maintenance
 - Demolition ... Reuse
 - Recycle
 - Dump

The architect and other consultants involved in material specification must give a broad consideration to these aspects in order to choose environmentally benign materials.

- .2 The same requirements for benign, emission-free products applies to the selection of furniture and furnishings. Selected carpet fabrics and other materials should meet the highest environmental standards.

1.3.4 EFFLUENTS & EMISSIONS

Every effort should be made to ensure that a new or renovated building has the lowest possible detrimental effect on the larger environment as well as on its interior spaces. Previous sections deal largely with the reduced use of resources. The University also seeks a reduction in the undesirable by-products of building.

.1 Air-Borne

Careful ventilation is required to reduce the harmful effects of toxic gases, odour and noise within a building, but these should not simply be exported to the outdoor environment. *Where and how* they are exhausted or dissipated requires special consideration to mitigate or, preferably, eliminate these exports.

.2 Water-Borne

Wastes which may appropriately be introduced into the sewage/waste water systems can be considered in three categories: *Hazardous ... sewage ... “grey” water.*

Known *hazardous* wastes must be reduced as much as possible and dealt with appropriately at source.

Grey water is recyclable (see above) and there are biological systems which can deal with *sewage* to provide useful water. Any opportunity to introduce such systems to the campus should be exploited.

Designs that put wastes, either treated or untreated, into water borne system must consider the impacts of these wastes on their final destinations.

1.3.5 OUTDOOR ENVIRONMENT

.1 Building Location and Orientation

Where choice is possible, new buildings should be *sited* for maximum access to sun and ventilating air movement (but not to the detriment of these assets in existing neighbouring buildings).

Building *configuration* should be subject to the same consideration and, in addition, should increase the all-season habitability of adjacent outdoor spaces. Shading and cooling air movement for summer, as well as sun-trapping and wind shelter for winter must be considered.

.2 The Campus “Floor”

It is desirable for the surface of the campus to be as receptive as possible to water absorption. The area of paved surface should be reduced wherever possible. Where paving is required, water penetrable systems should be considered.

.3 Planting

Plant material is normally thought of as *decorative*. In addition to this quality, it can be used for many purposes, such as food, for educational purposes and as a reflection of history. In the context of environment some of these qualities should be capitalized upon.

.4 Habitat

The University Campus is a significant element of the city’s open space network. It provides habitat for birds and animals. This role should be maintained and enhanced.

.5 Climate

The vital contribution which plants make to general air quality is well known. At a local level planting can - sometimes in conjunction with buildings improve micro climates. In the city, plants’ capacity for making places smell better cannot be ignored. Roofs can be plausible places for planting and this additional territory can be utilized. Planting policy of any individual project should, reinforce University-wide systems and also consider related policies such as safety and security.

.6 Maintenance

The University is continuing to seek ways of minimizing chemical use in campus maintenance and to find an economical and effective substitute for salt in snow clearance. Designs which can assist this policy - by material choice or other means - must be considered. Plant design should minimize the necessity for high maintenance wherever possible. *Naturalization* - the untrammelled use of local species - is encouraged.

1.3.6 WASTE MANAGEMENT

All projects should minimize the amount of waste sent to landfill by following the 3R's hierarchy - reduce, reuse and recycle, and assist the University in meeting the requirements of The Waste Management Act.

.1 Construction and Demolition

Design and planning of building renovations and/or new construction should ensure that, during the construction and demolition phases waste is avoided through the reuse of old materials, where practicable, either in the existing project or elsewhere. Scrap materials that cannot be reused, such as drywall, carpet, corrugated cardboard, wood or metal must be separated and recycled, where possible.

.2 Indoor Spaces

Designs for new or renovated spaces must consider placement of recycling containers. Public, lobby and lounge spaces require a system of depots for source-separation of waste that do not impede traffic flow. Offices and residence rooms require personal recycling and waste containers, as well as garbage/recycling rooms or centralized common disposal areas.

.3 Food Outlets

Any new food service areas require containers and space for the collection of source separated waste.

.4 Central Waste Facilities

New building construction requires sufficient space for the consolidation of and access to recycled materials and garbage.

.5 Outdoor Spaces

Outdoor public plazas, parkettes and corridors require a system of depots for source separation, the number of depots being dependent on the volume of pedestrian traffic.

1.3.7 **MONITORING**

It is increasingly necessary for Departments and Divisions of the University to take individual responsibility for maintaining good environmental standards within their purview. This will require an improved ability to measure performances and designers should consider effective methods of metering resource use and - in some cases - waste production in new and renovated premises.

ENVIRONMENTAL DESIGN STANDARDS CHECK LIST

A completed copy of this check list must be submitted by the design team to the University's Project Manager at the end of the design development phase. In all cases, items that do not comply (NC), must indicate the reason why. Attach additional sheets if necessary.

	C	NC	NA
1. Minimize Energy Use			
Life cycle assessments have been carried out on building equipment and operation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Explain process: _____			
Were central University systems used to supply thermal energy/cooling.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
What energy efficient equipment was used:			
High efficiency motors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Variable speed drives	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Thermal heat recovery (type: _____)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Presence sensor-activated light switching (type: _____)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other energy efficient equipment (type: _____)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Was the use of natural energy maximized:			
List ways: _____			
Does roofing design, type and colour minimize cooling requirements in summer.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Thermal envelope equals or exceeds the energy provision of _____. (i.e. R2000+, ASHRAE 90.1-1989, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Can windows be opened by occupants to maximize cross ventilation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use of natural daylight for illumination purposes has been maximized.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
List ways: _____			
Low energy use fixtures have been used for artificial lighting.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Minimize Water Use			
What water saving fixtures were used:			
Low flow toilets/showerheads	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Presence sensor-activated lavatories	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Presence sensor-activated urinals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other water saving fixtures (type: _____)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	C	NC	NA
Is 'grey' water re-used.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
List ways: _____			
Is rain water used for landscaping purposes.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
List ways: _____			
Has the use of city water to cool research equipment of building air conditioning been avoided. If not, list locations and explain why:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. Material Choice

Life cycle assessments have been carried out on products.

Itemize products: _____

Are these products emission free.

Carpets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Furniture	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fabrics	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Treated Wood	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wall Coverings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Paint	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Adhesives	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Have these products been selected to minimize the use of chemicals for cleaning.

Carpets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Furniture	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fabrics	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Treated Wood	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wall Coverings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Paint	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Adhesives	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4. Effluents and Emissions

Have certificates of approval been obtained for emissions to the outside.

Has ventilation been provided specifically to reduce effects of gases and odours.

Where and how is exhaust dissipated: _____

	C	NC	NA
Have airborne emission dispersion studies been executed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Will hazardous wastes be dealt with at source.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How: _____			
Will any wastes go into the water system.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If yes, has the impact been considered. How: _____			

5. Outdoor Environment

The positioning of the new building maximizes naturally occurring sunlight and air movement.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A water-penetrating pavement system has been used.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Does the design of paved areas minimize the use of salt for ice-clearing.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How: _____			
The campus flora and habitat have been respected and the purpose of the planting materials have been addressed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The choice and location of trees provide building shade in summer and windbreaks in winter.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If the roof used for planting.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The use of local plant species has been encouraged.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6. Waste Management

Will demolition /construction waste be recycled/reused.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How: _____			
Placement of indoor recycling containers has been addressed in the design.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Placement of outdoor recycling containers has been addressed in the design.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Food outlets have source-separated waste collection containers designed in the facility.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sufficient space has been allowed for consolidation of waste and recycling.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7. Monitoring

Environmental standards have to be monitored and measured. Indicate that this has been provided for each discipline and describe the proposed monitoring method.

	C	NC	NA
Thermal energy use:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Electrical energy use:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Water use:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Effluent and emissions:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Waste management:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

END OF PART ONE SECTION 9 - ENVIRONMENT SECTION