UNIVERSITY OF VICTORIA
CAMPUS SUSTAINABILITY GUIDELINES
REVISED VERSION
PREPARED BY CAMPUS PLANNING
MAY 2006

UVIC CAMPUS SUSTAINABILITY GUIDELINES

I INTENT OF THE GUIDELINES

These guidelines outline the University of Victoria's process for applying its sustainability objectives to major capital projects. It is intended to assist members of the campus planning committee, user & building committees, and project design teams understand and implement the Campus Plan's sustainability policies. The guide was developed and revised with input from the Campus Planning Committee (CPC) and the Facilities Development & Sustainability Sub-committee (FDSS).

These guidelines seek to achieve the following objectives:

- To ensure that campus building projects reflect the sustainability objectives of the Campus Plan
- To provide a decision-making process to determine the costs and benefits of developing a sustainable building project and certifying a project under the LEED (Leadership in Energy and Environmental Design) rating system.
- To provide more consistency and transparency in the decision-making process regarding sustainability and green building design.
- To inform design teams of the University's expectations with regard to incorporating sustainable practices in construction projects
- Provide information on approaches and practices that can be integrated in the planning and developing of future buildings and facilities.

Implementing the Campus Plan

The Campus Plan identifies a number of principles, policies and actions for improving the overall sustainability of the campus. The plan, and these guidelines, recognizes that the overarching principle of the university is to fulfill its mission and legislative requirements of providing post-secondary education. Principle #1 of the campus plan is: *Development decisions will give priority to the academic, teaching and research needs of the University.*

These guidelines provide options for meeting the academic mission of the University in a manner that is socially, economically and environmentally sustainable. The guidelines are intended to assist campus planning committees, campus staff, users and building committees and building design teams in making decisions about campus sustainability, including new construction, major renovation projects, campus planning decisions and new facilities.

Sustainability Implementation Considerations

Selected strategies may be incorporate into the design of building projects and campus planning initiatives when the university determines that those strategies are feasible and beneficial given the unique site and building characteristics. This determination will be based on an evaluation of several factors including, but not limited to:

- Congruence with the university's academic mission and strategic direction
- Overall academic benefit, including research opportunities, technology transfer potential, and/or demonstration opportunities
- Compatibility with the intended building program

- Environmental benefits (for the project and campus as a whole)
- Capital costs
- Operational cost savings
- Maintenance, durability and warranty implications
- Aesthetic and design consistency

Investments in sustainability will be evaluated on a project by project basis to ensure that they provide good value for the university considering the broad range of costs and benefits as indicated above.

Many of the University's sustainability initiatives involve the entire campus. For example, the programs for transportation demand management (TDM), recycling and waste management, and policies on compact development, integrated stormwater management, parking management and energy management. As such, these guidelines include campus-wide strategies that may be used by members of the Campus Planning Committee(s) to make planning and siting decisions; as well as building-specific strategies that may guide the work of the project design/consulting teams.

The University recognizes that sustainability extends beyond building projects. The University has made considerable investments and progress in the areas of energy management, stormwater management, TDM, natural features protection and restoration, and responsible waste management practices. Future building projects are expected to respect and reinforce these initiatives.

Sustainability definition

Sustainability is an economic state where the demands placed upon the environment by people and commerce can be met without reducing the capacity of the environment to provide for future generations. It can also be expressed in the simple terms of an economic golden rule for the restorative economy: leave the world better than you found it; take no more than you need; try not to harm the life of the environment; make amends if you do.

Paul Hawkin in the Ecology of Commerce

The guidelines are informed by a number of sources, including the University's Campus Plan, municipal requirements, Canada Green Building Council's (LEED) rating system *(see appendix),* and approaches used by other North American universities.

II Sustainable Design

The concept of sustainability, green buildings, and smart growth are not new concepts at UVic. While the terminology has changed over time, the concept of developing a walkable, energy-efficient, human scale campus dates back to the initial creation of this campus in the early 1960's. What has changed is the level of interest shared among the campus community and members of the planning committees in sustainability issues and the recognition of the on-going effort and commitment required to develop a truly sustainable campus.

Green building practices are also becoming more "mainstream". As industry and consumer demand for sustainable developments and products increases, the financial premium that used to be associated with green building is diminishing and product availability is increasing. Technology improvements and advances in design are making green buildings much more accessible.

What Are Green Buildings?

Green buildings incorporate energy and resource efficient features designed to improve environmental performance and user comfort. Features may include:

- building site that takes advantage of existing infrastructure (including transit), microclimatic conditions, and redevelopment opportunities.
- Thermally efficient windows, walls & roofs
- Water efficient fixtures
- Designs that take advantage of solar access, natural ventilation and day lighting
- Flexible interior designs
- Use of environmentally-friendly paints, floor coverings, and building materials
- On-site stormwater management techniques such as ponds, green roofs and porous pavings designed to reduce rate of flow and improve water quality
- Landscaping which uses natural and durable plantings which require minimal irrigation and pesticides.

The development of green buildings and sustainable campus practices provide a broad range of benefits that go beyond environmental health. They include;

- Saving operation expenses, at little or no additional capital cost
- Building designs that are environmentally responsible and aesthetically pleasing
- Reduce sprawl development and encourage smart growth
- Create healthy indoor and outdoor campus environments
- Improve student learning
- Increase student, faculty and staff productivity
- Support markets for sustainable building materials and supplies
- Demonstrate to students, local governments and community members that the university can "walk the talk" on sustainability
- Educate students about green design, sustainability and responsible resource management
- Position the university as a leader in sustainable campus design

Campus Sustainability Guidelines

The campus sustainability guidelines reflect two main sources of information: the campus plan, and the LEED (Leadership in Energy and Environmental Design) green building rating system.

While many of the guidelines reflect the basic categories of the LEED rating system, they acknowledge that a campus environment enables one to move beyond the building-specific orientation of the LEED rating system. Because of its comprehensive nature and industry credibility, the LEED rating system is useful as a goal-setting tool and benchmark for building sustainability. Should the Canada Green Building Council develop a rating system for campus environments, the University's sustainability guidelines may be revised to reflect that rating system.

These guidelines do not mandate the application of LEED or any other sustainability rating system; the extent of application would be determined early in the planning stage base of each project on appropriate evaluation criteria.

Many of the university's sustainability initiatives involve the entire campus, for example, transportation demand management, recycling programs, more compact development, and energy management initiatives. As such, these guidelines list campus wide strategies that may be used by members of the campus planning committees to make planning and siting decisions; as well as building-specific strategies that may guide the work of the project design/consulting teams.

Campus sustainability extends beyond sustainable buildings. The University has made considerable investments and progress in the areas of energy management, stormwater management, transportation demand management, habitat and natural features protection and restoration, and responsible waste management practices. Future building projects are expected to respect and reinforce these initiatives.

Campus Planning & Site Design

Good campus planning supports the wise use of land, creates operational efficiencies, minimizes negative impacts on the land and surrounding uses, and improves the aesthetics of the campus and neighbouring communities. All siting decisions will assess and consider the long-term impacts of current decision-making on the campus community as well as the university's resources, academic programs and operational costs.

Goal: Accommodate campus development on the sites which enhance the academic mission while minimizing environmental impacts to the existing open spaces and natural features and systems.

Campus Strategies:

- Ensure consistency with the current campus plan
- Minimize the amount of resources needed to sustain the campus
- Reduce the impact of the campus on municipal services
- Reduce site disturbance associated with construction projects
- Continue to support a compact, walkable campus, with the majority of academic buildings accessible within easy walking distance.
- Maintain and renovate existing buildings to optimize the use of existing academic space
- Utilize surface parking lots within the Ring Road for building sites

Building-specific Strategies

Pre-Design:
- Select a site which reflects campus plan policies and objectives.
- Reuse development sites or previously paved/altered sites where possible
- Locate sites where infrastructure is easily accessed or can be provided with minimal site disturbance and environmental impact
- Assess and document site-specific environmental conditions, including stormwater run-off, vegetation, and soil conditions.
- Incorporate sustainability goals and objectives in the program of requirements, consultant selection criteria and project terms of reference

Design:
- Minimize the area of the site dedicated to building and parking and access roads to the extent possible for the building program, user comfort and campus aesthetics
- Maintain building setbacks that effectively utilize the site while respecting the surrounding environmental conditions and campus aesthetics
- Site building to minimize pedestrian and vehicular traffic conflicts

Construction Documentation & Specifications
- Specify site construction practices that support or enhance the ecological integrity of the site
- Specify procedures to protect the site during construction which include, at minimum, tree protection requirements, soil removal, erosion control.

Construction:
- Protect vegetation, topsoil, and ecologically sensitive areas during construction
- Select a staging area for construction equipment and materials which minimizes site disturbance and traffic impacts

Post-Construction
- Educate building users on sustainable building features, natural systems and environmental features

Sustainable Transportation

The University recognizes that land use and transportation decisions are linked and can profoundly affect the way the campus feels and functions. The University supports a comprehensive transportation demand management (TDM) program designed to reduce single occupant vehicle use and the associated traffic levels and parking demand.

Sustainable transportation options should be incorporated into siting decisions to reduce dependence on car travel, reduce the amount of impervious pavement on the site, and reduce the financial, environmental and community costs associated with excessive parking supply.

Goal: Reduce the rate of growth in traffic volumes and parking demand by providing and encouraging sustainable transportation choices

Campus-wide strategies
- Maintain a pedestrian-friendly campus
- Provide student-oriented housing opportunities on campus
- Cluster academic, research, administrative, residential and recreational uses within easy walking distance to reduce the need for on-campus vehicular travel
- Use parking management as a tool to support TDM initiatives
- Provide preferential parking for car/van pool vehicles & car-share vehicles

- Make provision for electric bikes and vehicles on an as-needed basis
- Continue to monitor and audit traffic volumes and modal share
- Continue to implement, monitor and refine campus transportation demand management programs & initiatives

Building-specific strategies

Design:
- Provide shower and change facilities in all new buildings over 1,500 m2 in gross area wherever possible.
- Incorporate bike parking and shelters to meet building-related needs in a safe, convenient and aesthetically-pleasing manner
- Link entranceways and public spaces to the campus pedestrian network
- Design pathways and pedestrian corridors to link to new and existing transit stops, pedestrian drop-off areas and parking lots

Construction Documentation & Specifications
- Specify requirements to accommodate pedestrian traffic and wheelchair accessibility during and after construction

Energy Efficiency and Renewable Energy

Buildings are energy intensive in their construction and operation. According to the Worldwatch Institute about 40% of the world's total energy usage is dedicated to the construction and operation of buildings.

The University supports three fundamental strategies for increasing energy performance: reducing demand, taking advantage of natural systems, and increasing efficiency. Demand is reduced by optimizing the building footprint and orientation on the site, use of lighting controls & task lighting, occupant controls and occupant behaviour changes (sweaters in winter, short-sleeves in summer). Natural systems can be utilized by orienting buildings to take advantage of natural light (daylighting) and natural ventilation (e.g. operable windows). Increasing efficiency can be achieved through limited use of air conditioning, use of high-efficiency lighting and appliances.

Goal: Reduce the total energy consumption of campus facilities and buildings, and minimize the associated environmental and energy costs.

Campus-wide strategies

- Continue to work with BC Hydro and other partners to optimize the energy efficiency of the campus
- Explore opportunities & economic feasibility of the use of renewable energy
- Purchase green energy certificates
- Support education programs which provide information to faculty, staff and grad students on how to reduce energy consumption in offices

Building-specific strategies

Pre-design:
- Consider opportunities to utilize natural systems in the site selection process. Consider solar access (especially for courtyards and seating areas), shadowing, vegetation, topography, wind patterns
- Establish energy efficiency goals in the program of requirements
- Arrange functional space to reduce extent of mechanical ventilation

Design:

- Utilize energy modeling for new buildings to optimize energy performance and assess options
- Locate and orient the building to optimize solar access and daylighting opportunities
- Utilize shading devices such as sunshades and overhangs to control solar gain
- Develop design strategies that optimize the performance of the building envelope
- Incorporate occupancy sensors that control lighting in all spaces not regularly occupied, including common areas, where practical
- Involve commissioning representative early in design process to optimize building efficiency and performance

Construction Documentation & Specifications

- Specify requirements for energy-efficient equipment and high-efficiency lighting and occupancy sensors and/or control systems
- Specify standards for heating, ventilation, and air-conditioning (HVAC) systems. It is university building policy to limit the extent of air-conditioning in buildings to specific areas and application such as server rooms, animal care facilities, laboratories with fumehoods, and special collections and archives.
- Verify and monitor the performance of building systems to ensure they have been designed, installed and operating to meet energy-efficiency expectations

Post-Construction

- Educate building users about energy-efficiency features, systems, controls
- Periodically measure energy consumption

What is CBIP & the MNECB?

Natural Resources Canada's Commercial Building Incentive Program (CBIP) provides financial incentives for the incorporation of energy efficiency features in new building designs, to a maximum of $60,000. To qualify, a building must meet the mandatory requirements of the Model National Energy Code for Buildings (MNECB) and be at least 25% more energy efficient when compared to a reference design (e.g. what the building would consume if built to conventional standards).

The Model National Energy Code for Building (MNECB) is a model energy efficiency code published in 1997 by the National Research Council Canada (NRCC). The code sets energy efficiency standards for commercial building construction.

To meet the requirements for CBIP a computer simulation tool is used to model the building, which is used to calculate the annual energy consumption of the proposed building design, and an equivalent that is barely compliant with the MNECB standard. Two building computer models are developed: the proposed building and a comparative building built to more conventional standards. The two building models must be comparable in terms of size, orientation, massing, occupancy, hours of operation, and thermostat setpoints.

Water Efficiency & Stormwater Management

As a large institution, the University consumes significant volumes of potable water and contributes to the municipal stormwater and sewer systems. To reduce its servicing costs, and to reduce capacity constraints in the municipal systems, the university will support efforts to reduce flows into these systems. Approaches may include: low flow faucets and toilets, waterless urinals, motion sensors and electronic controls on sinks and lavatories.

The University developed an Integrated Stormwater Management Plan (ISWMP) and contributes to this plan by limiting use of fertilizers and pesticides; maintaining open spaces; protecting stream beds; minimizing construction-related vegetation removal; ensuring timely replanting of building sites; and minimizing the overall extent of impervious surface (such as parking lots) and building area. The University's Integrated Stormwater Management Plan (ISWMP) is the starting point for all building-specific stormwater management plans.

Goals:

- Manage stormwater sustainability
- Reduce potable water consumption
- Re-use non-potable water resources to the extent possible
- Minimize load on municipal stormwater system

Campus-wide Strategies

- Use natural drainage ways wherever possible
- Minimize the need for landscape irrigation and use efficient irrigation systems to minimize water consumption
- Incorporate water re-use and/or greywater systems for irrigation and other non-potable water requirements (e.g. toilets, vehicle washing)
- Work with local governments and other regulatory bodies to develop or modify standards to accommodate sustainable initiatives

Building-specific strategies

Pre-design

- Develop/confirm goals for the management of site water and water conservation
- Select a site which will minimize alterations and ecological impacts to the receiving streams/watersheds
- Determine whether water re-use and/or grey-water systems are appropriate for the site and building function

Design:

- Utilize natural/naturalized systems to manage stormwater: (e.g. sediment control ponds, retention ponds, bio-swales, etc.)
- Minimize extent of impermeable surfaces on site; utilize permeable surface materials to enhance site water absorption and reduce run-off
- Utilize natural and hardy planting to reduce need for irrigation
- Utilize low-flow faucets, shower-heads and toilets
- Utilize waterless urinals where practical

Construction Documents & Specifications

- Specify approaches to retain and treat water on-site
- Specify sedimentation and erosion control procedures to protect the site during construction
- Specify irrigation system requirements/standards
- Specify water saving fixtures/faucets
- Specify requirements for water reuse (if utilized)

Construction

- Monitor sedimentation and erosion control systems, especially after storm events

Post-Construction

- Evaluate performance of water management systems, permeable paving materials and applications, new technologies, etc.
- Educate building users on water conservation and water re-use systems

Waste Management

Waste is generated through the life of a building, including demolition, renovation, construction and operations/occupant use. In addition to reducing its own operating costs and environmental impacts, the University also needs to consider the regional goals and regulations regarding landfill disposal and recycling.

Goal: Minimize waste generated on campus and facilitate the better management of waste through reuse and recycling

Campus-wide Strategies

- Minimize building-related waste through effective space and capital planning
- Assess opportunities for building and material reuse
- Maintain and expand campus-wide provisions for recycling materials
- Provide easily accessible recycling stations throughout the campus that allow for the collection and separation of materials, consistent with the requirements of the Capital Regional District (CRD)
- Provide recycling stations at convenient locations both inside and outside of buildings, including event gathering areas, parking lots, and plazas

Building-specific Strategies:

Design:

- Ensure that buildings are designed to be flexible, durable and long-lasting. Buildings should accommodate changes in space planning and academic programs and, where possible, be expandable to allow future space additions
- Plan for maximum standardization or repetition of building elements to accommodate future additions, alterations and program changes
- Require contractors to incorporate a construction waste management plan
- Design area (such as loading dock) for recycling handling
- Design facilities for recycling and waste handling that are convenient for maintenance and waste handlers, encourage appropriate use, and are aesthetically acceptable
- Provide space in food services spaces to collect food wastes

Construction Documentation & Specifications

- Include requirements for a construction waste management plan that addresses any demolition and salvaging requirements, as well as sorting, recycling and disposal specifications
- Specify supplier requirements for reusable, recyclable, and recycled content materials and/or packaging
- Detail recycling system requirements in construction documents for construction and occupant-use

Construction

- Reuse site materials, such as soil and land clearing debris which can be shredded for mulch
- Provide appropriate containers/facilities for construction material recycling & disposal
- Take steps to reduce amount of packaging material (e.g. vendor take-back requirements, recycling provisions, etc.)

Post-Construction
- Educate building users about recycling programs. Post signage to facilitate recycling.

Conserving Materials

Building materials choices are important in green building design because of the extensive network of extraction, processing, and transportation steps required and the ecological impacts of their eventual disposal. Activities associated with the production of building materials can contribute to air pollution, habitat destruction and resource depletion.

Goal: Minimize consumption and depletion of material resources; especially those from non-renewable resources

Campus-wide strategies
- Research and evaluate the environmental impacts of building materials
- Assess opportunities to reuse and recycle materials

Building-specific Strategies

Design:
- Develop design strategies that utilize materials with low environmental impact
- Assess life-cycle cost implications of materials. (Life cycle cost means the amortized annual cost of a product, including costs for capital, installations, maintenance, disposal discounted over the lifetime of the product.)
- Use products and materials that are durable, weather well and are appropriate to the demands of academic programs and student use
- Assess opportunities to use materials from renewable sources
- Assess opportunities to use locally manufactures materials
- Utilize low-toxic materials

Construction Documents & Specifications
- Specify material requirements

Post-Construction
- Evaluate materials and suppliers for future building projects

Indoor Environmental Quality

Goal: Provide interior environments that enhance user comfort, well-being, and productivity

Campus-wide Strategies:
- Provide smoke-free buildings and relocate designated smoking areas away from building entrances and air intakes
- Separate air intakes from loading areas and building exhausts
- Limit the use of mechanical air conditioning

Building-specific strategies

Design:

- Develop site plans to minimize potential pollutant sources in areas adjacent to the building. Consider the location of roads, parking lots, loading areas, and odour-generating facilities
- Develop design strategies to optimize natural ventilation
- Use no or low volatile organic compounds (VOC) paints for interior applications to the extent possible
- Incorporate occupant controls for airflow, temperature and lighting, where possible and practical. Include lighting controls, task lighting and operable windows
- Maximize interior daylighting, particularly in office areas
- Maximize view opportunities to provide a connection between interior and exterior space for regularly occupied areas of the building

Construction Documents & Specifications

- Specify ventilation systems to comply with the most recent ASHRAE standards for Ventilation for Acceptable Indoor Air Quality for all new construction. (This standard specifies the minimum ventilation rates and indoor air quality (IAQ) levels to reduce the potential for adverse health effects. The standard specifies that mechanical or natural ventilation systems be designed to prevent uptake of contaminants, minimize the opportunity for growth and dissemination of microorganisms, and filter particulates, if necessary)
- Specify a ventilation schedule that includes a flush period to remove contaminants and off-gassing prior to occupancy

Construction

- Develop an indoor air quality plan to reduce potential for air contamination during the construction process

Post-Construction

- Use building commissioning process to ensure that natural and/or mechanical ventilation systems are installed, balanced, and operating effectively
- Monitor air intakes and exhausts to maximize air quality over time
- Assess and evaluate systems and materials for use in future projects

III SUSTAINABILITY ASSESSMENT PROCESS

The University embraces sustainable design principles in its construction and major renovation initiatives. As these guidelines explain, University projects may or may not seek certification under the LEED green building rating system, however, all University projects are expected to apply sustainability principles balancing the constraints of technology, funding, and material availability.

A thorough review by the University and the design team is required before arriving at a final decision to certify a building project using the LEED rating system criteria and these guidelines.

The intent of the sustainability assessment process is to evaluate the basic categories associated with the LEED rating system and these guidelines and provide transparent documentation of the initiatives considered and implemented. The categories to be assessed include:

- Site planning & site design
- Sustainable transportation
- Energy efficiency and renewable energy
- Water efficiency and stormwater management
- Conservation of materials and resources
- Indoor air quality
- Innovation

I Pre-design Phase

A sustainable design process recognizes that a building's systems and components are interrelated and thus, sustainability goals must be established at the project's initiation.

Involving the University and the consultant design team in the goal-setting and design process enables the resulting design to incorporate sustainability goals without significant initial cost premiums. This will also ensure that the resulting project is compatible with the expectations and culture of the University and supportive of the project's program.

Activities fundamental to making the campus more sustainable include:

Space Planning:
The role of Institutional Analysis and Capital Planning are critical at this stage to ensure that the existing inventory of space is optimized to meet user needs without over-building. Activities include

- verifying enrolment growth trends and projections
- verifying space needs
- optimizing space efficiencies
- confirming additional space requirements

Site Selection:
Appropriate site selection is critical to meeting the goal of a more sustainable campus. No amount of design can overcome a poor siting decision. Key activities include:

- ensuring all new developments are placed on the most suitable sites possible
- avoiding unnecessary impacts to environmentally-sensitive areas and key open spaces
- reflecting the principles of the campus plan
- promoting a compact, walkable campus

Project Development:
An important starting point in any major capital project is to incorporate appropriate sustainability and green design considerations in the project terms of reference (s), request for proposals, design team selection process, and project schedule and budget. Either at this stage, or prior to

the completion of the schematic design phase, the University will establish an obtainable sustainability target for the project, recognizing the opportunities and constraints within a given project such as site, functional requirements, budget, and broader university goals.

Programming:
The programming phase provides a good opportunity to educate users on the campus sustainability objectives and the importance of individual user commitments (e.g. responsible use of occupant controls, dressing for weather, using alternative transportation, recycling, responsible resource use, and the like). Activities at this stage may include:

- Examine preliminary opportunities and identify strategies
- Conduct workshop sessions with user group to inform them of campus plan & sustainability objectives. The workshop may also be used to establish, evaluate and prioritize sustainability goals for the new project. These goals will be reflected in the subsequent sustainability checklists
- Identify opportunities to share space or co-locate activities within new buildings to maximize academic opportunities while minimizing overall material and resource requirements

Sustainability Assessment Deliverable #1: Pre-Design Sustainability Assessment

The pre-design sustainability assessment should be undertaken at the initial stage of the project as soon as the design team has been hired. Initial work on the assessment may begin in the programming stage.

Using the categories listed above, the design team and University project staff should use these Guidelines and LEED rating checklist to prepare a preliminary assessment of what could be obtained based on three different approaches:

1. Standard Approach: Identification of LEED criteria that can be met with minimal to no additional effort or cost. These will include campus wide conditions (such as proximity to transit) and basic university standards (e.g. application of integrated stormwater management system).

2. Targeted Approach: Identification of LEED criteria that could be met with minimal increase in capital budget (e.g. not exceeding 1.5 % of construction budget).

3. Comprehensive Approach: Identification of LEED criteria that could be met with an increase in the capital budget exceeding 1.5 % of construction budget. Projects at this level may be considered where funding is made available outside of the capital project budget and where considerable campus benefits are identified including, academic advancement, technology transfer opportunities, short term payback period, and the like.

For each approach, the design team shall indicate the known costs, estimated payback periods, and sustainability benefits. This information may be supplemented by the university's project and facilities staff.

This information shall be compiled in draft assessment report for review by the University's project and facilities staff.

II Design Phase

The building design phase includes schematic design and design development.

Schematic design is a critical phase where the general scope, program relationships, initial design, scale, massing, and materials are determined. Requirements and design solutions are refined through the design development process.

Activities include:

- Confirming the decision-making process and criteria for incorporating sustainability in new building projects
- Developing and evaluating green design options, utilizing a facilitated workshop, if this was not done in pre-design phase
- Modeling energy efficiency (and potential to qualify under CBIP program)
- Assessing costs and benefits of sustainability approaches (identify possible financial incentives and grants)
- Refining and prioritizing strategies
- Determining (and quantifying) the merits of formal registration in the LEED green building rating system

Sustainability Assessment Deliverable #2 Schematic Design Stage Checklist:

The design team shall prepare a sustainability checklist at the schematic design stage that reflects the information contained in the preliminary assessment report and any further input from the University.

The checklist should use the LEED rating system as a benchmark, regardless of the decision to register the project. The checklist should identify the basic LEED categories, the LEED prerequisites, credits that are easily obtainable, credits that need further analysis, and credits that are not likely or not applicable to the particular project. The schematic design phase checklist should also include the campus-wide and building-specific strategies outlined in these Guidelines that can be applied to this project.

The checklist shall be submitted to the Campus Planning Committee (or an established sub-committee) for their review and comment, at or before the time of Schematic Design approval.

Registration in the LEED Green Building Rating System: The decision to adopt any particular approach shall ultimately be made by the University administration based on the following:

- Documentation of the sustainability costs and benefits associated with each of the three scenarios as determined by the design team, university staff, and the cost consultants
- Availability of funding beyond the approved capital project budget
- Identification of academic, research, teaching and/or technology transfer benefits as determined through consultation with the user group, associated dean(s), VP Academic (or delegate)
- Recommendations from the Campus Planning Committee

If formal registration in LEED is pursued, the University and the design team will proceed with ensuring all prerequisites are met, and will continue to refine the checklist as the project proceeds through the design process.

If formal registration in LEED is *not* pursued, the University will proceed with implementing both building-specific and campus-wide sustainability strategies based on information from the preliminary assessment report, schematic design checklist, and recommendations from the Campus Planning Committee.

The final decision to register a building program and to pursue any sustainability initiatives that have cost implications beyond the approved project budget rests with the office of the Vice President Finance and Operations (VPFO).

Design Development: The design team and the University project team shall continue to refine the checklist as the project proceeds through the design process as priorities, costs and technologies are better known.

Sustainability Assessment Deliverable #3 Design Development Checklist:

An updated sustainability checklist should be calculated near the completion of design development. This checklist should be the basis of implementation through the development of contact documents, tender documents and construction standards and specifications.

If the project is formally registered under LEED, the checklist will reflect the documentation requirements of the Canada Green Building Council's LEED Canada-NC reference guide. If formal registration is not pursued, the sustainable building checklist may be used.

The checklist will be divided into categories, identifying whether the credit values are required (LEED prerequisites and University requirements), almost certain, possible (but may need more analysis), unlikely, and not applicable or recommended (e.g. too much cost for too little benefit). Cost effectiveness or the availability of additional funding sources may result in these possible credits being incorporated into the project, otherwise they are not considered further. The checklist shall be reviewed periodically and updated to reflect the status of the project budget, design opportunities and funding sources.

Depending on the nature and extent of the project, another facilitated sustainability workshop may be held prior to finalizing the design development checklist.

III Construction Phase

The objective of the construction phase is to build the project as represented in the contract document within the parameters approved by the Board of Governors. The design team and University personnel should clearly communicate the sustainability goals and green solutions with the construction manager/contractor to explore opportunities for innovation and efficiencies.

Activities may include:

- Identify and submit contract documents to include contractors with experience in sustainable design.
- Informing/educating contractors about sustainable design objectives.
- Verifying requirements and submittals for green products and systems.
- Developing/confirming the construction waste management plan
- Developing/confirming the construction indoor air quality management plan, when applicable
- Developing the commissioning plan

Sustainability Assessment Deliverable #4 Project Conclusion Report:

At the conclusion of all major projects, a final project report shall be prepared which indicates the following:

- Project summary information (net and gross figures, budget, etc.)
- Site plan, building design and elevations, landscape plan and plant list (as submitted for municipal approvals)
- Final sustainability checklist
- Summary report indicating the rationale for sustainability approaches used, as well as those not considered or included
- Any recommendations for future projects

This report shall be submitted to the Campus Planning Committee.

IV Substantial Completion and Occupancy

This phase facilitates the occupancy and turnover of the finished and fully commissioned project to the occupants and university operations and maintenance group. It is important for building occupants and maintenance staff to understand how the building is designed to function, particularly as it relates to specific user behaviour, in order for it to function as efficiently as possible.

Steps:

- Conduct final tuning of the building systems
- Regularly confirm system performance
- Train operations and maintenance personnel about systems
- Educate occupants about systems, user controls, advantages of sustainable systems
- Perform maintenance
- Monitor the project performance to gather and document the lessons learned so that future project may benefit from the experiences of the completed project

The University may assign the responsibility for building commissioning to the Director of Maintenance and Operations or his/her delegate. The commissioning authority will be responsible for preparing a commissioning plan, conducting site reviews and ensuring that maintenance and operations staff are trained – to ensure that fundamental building elements and systems are designed, installed and calibrated to operate as intended.

Conclusion:

Implementation of a sustainable/green building project through the Canada Green Building Council/LEED process is extensive and requires a significant commitment of time and effort by the University, the project and design team, and the facilities management department involved in the life of the project. However, the benefits are significant. The University obtains a project built to high standards, which is energy and resource efficient, and durable and flexible enough to accommodate future change with a minimum of disruption, loss of productivity and waste. High quality green buildings are attractive to the users, future students and faculty, and are usually highly valued by the surrounding community and donors. For a University that offers academic programs in sustainability-related areas (business, environmental studies, climate change, alternative energy, and the like), sustainable building projects can provide a learning laboratory and a key marketing tool.

APPENDIX ONE

2003 CAMPUS PLAN POLICY DIRECTION

The University adopted the Campus Plan in 2003 which contained principles and policies for a more socially, environmentally and fiscally sustainable campus. The plan clearly acknowledges that sustainability includes:

- Opportunities to enhance social interaction through human-scale designs
- Provision of sustainable transportation infrastructure and programs
- Protection & enhancement of environmentally-significant natural areas
- Commitment to "low-impact" development and green buildings
- Responsible stewardship of land through the use of smart growth/efficient development principles

The University recognizes that its buildings and facilities have an impact on those who use them. Additionally, it is recognized that water usage, site drainage, energy use, building materials, and construction practices have long-term environmental impacts beyond the borders of the campus.

Principle #6 of the plan, Sustainable Buildings and Facilities, states: *The University commits to incorporate sustainable practices in the planning, construction and operation of buildings and facilities.*

Relevant Campus Plan Policy Directions:

Academic Integration: The University will strive to ensure the integration of academic priorities, compact development, and principles of sustainability in the planning and construction of all new facilities.

Green Guidelines: Decisions on facilities' siting, site development, building design and materials will respect the *Environmental Guidelines: BC University College and Institute Facilities (1995)* and the *Green Buildings BC* program of the British Columbia Buildings Corporation. Future buildings, including materials, will be designed using the LEED (Canadian) rating system of the Canada Green Building Council.

Environmental Sustainability Features: New facilities will receive special siting and design attention to incorporate environmental sustainability features. Techniques will be used to minimize erosion and sedimentation in site development, improve water efficiency, steward energy use, increase the recycled building materials, and reduce the use of non-renewable resources.

Sustainability Practices: The University will continue to support sustainability practices, with particular attention on resource conservation, waste reduction, energy utilization, water management and drainage, reporting and enforcement mechanisms.

Compact Development: The compactness of the campus will be maintained by the judicious use of specific building sites within or near to Ring Road. This includes the potential for infilling lawn areas and redeveloping surface parking lots and small, lower scale buildings.

Preferred Building Sites. Preferred building sites have been identified which:

- Infill within a compact area
- Locate new buildings in proximity to existing buildings
- Build on existing parking lots; and
- Minimize impact on natural areas.

Building Footprint: In the planning and design of new buildings, early consideration will be given to accommodating more floor-space within a smaller building "footprint" to enhance compactness and minimize impacts.

Promoting Sustainable Modes of Travel to Campus:

- The University will continue to work with BC Transit and on-campus user groups to better define campus access patterns in order to encourage the increased use of public transit
- The University will continue to work with the UVic Bicycle Users Committee and other bicycle stakeholders to develop safe and convenient access to campus for cyclists
- The University will complete a comprehensive transportation demand management study (TDM) in consultation with the community, leading to the implementation of a combination of strategies that will reduce single-occupant vehicle (SOV) demand. These will include both disincentives to SOV use and incentives for High occupancy Vehicles (HOVs) and use of alternative modes of travel.

APPENDIX TWO

THE LEED RATING SYSTEM

The Leadership in Energy and Environmental Design (LEED) Building Rating System is a voluntary standard for defining what constitutes a “green building. LEED was created by the US Green Building Council (USGBC), a non-profit organization representing the building industry, and responsible for promoting the understanding, development, and implementation of “green building” policies, program technologies, standards and design practices on the national level. The LEED program is administered in Canada through the Canadian Green Building Council (CaGBC).

The LEED rating system employs a whole building approach and encourages the project team through a collaborative integrated design and construction implementation process that seeks to balance environmental and economic cost factors in a responsible manner.

What is LEED?

The Leadership in Energy and Environmental Design (LEED) Building Rating System is a voluntary standard for defining what constitutes a “green building.

The LEED rating system helps identify effective ways to address the health, resource and environmental issues of building design and construction. One of its goals is to encourage and assist architects, engineers, builders and developers to develop improved standards of practice and performance.

Canada Green Building Council LEED Canada-VC 1.0

The LEED rating system helps identify effective ways to address the health, resources and environmental issues of building design and construction. While the process for certifying a building through the LEED rating system can sometimes be time consuming and cumbersome in areas, the underlying objectives of LEED reflect good planning principles and environmentally-responsible practices. To a large extent, it provides for on-the-ground implementation of the campus plan policies dealing with sustainability, smart growth and transportation demand management.

How LEED works:

The LEED program has six basic categories:

1. Sustainable Sites
2. Water Efficiency
3. Energy & Atmosphere
4. Materials & Resources
5. Indoor Environmental Quality
6. Innovation & Design Process

The LEED rating system is a set of performance standards where credits are earned for satisfying each criterion. The standards are based on accepted energy and environmental principles and strike a balance between known effective practices and emerging concepts. Different levels of green building certification are awarded based on the total credits earned.

There are several goals within each category. Based on the number of goals that a project is able to successfully implement, the building is awarded a rating.
The four levels of certification under the LEED rating system are:

- LEED Certified 26-32 points
- LEED Silver Level 33-38 points
- LEED Gold Level 39-51 points
- LEED Platinum Level 52-69 points

Initial Costs

Although LEED buildings have been found to repay the extra costs of construction over the life of the building, the additional upfront costs of LEED participation can increase the capital budget. There is an application fee for the LEED certification process. In addition, it takes time and energy to complete and file documents at the appropriate stages. Architects, consultants and contractors may charge more if they are required to meet LEED standards. The average cost premiums for LEED certified buildings are less than 2% of construction and this is usually paid back early, and several times over the life of the building.

Specific Components of the LEED Rating System

1. Sustainable Sites:
   - Site selection
   - Urban redevelopment (e.g. use of parking lots)
   - Brownfield redevelopment
   - Alternative transportation
   - Reduced site disturbance
   - Storm water management
   - Landscape and exterior design to reduce heat islands
   - Light pollution reduction

2. Water Efficiency:
   - Water efficient landscape
   - Innovative wastewater technologies
   - Water use reduction

3. Energy and Atmosphere:
   - Fundamental building system commissioning
   - Minimum energy performance
   - Optimal energy performance
   - Renewable energy
   - Additional commissioning
   - Measurement and verification

4. Materials and Resources:
   - Storage and collection of recyclables
   - Building reuse
   - Construction waste management
   - Resource reuse
   - Recycled content
   - Local/regional materials
   - Rapidly renewable materials
   - Certified wood

5. Indoor Environmental Air Quality
   - Minimum IAQ performance
   - Environmental tobacco smoke control

- Carbon dioxide monitoring Increase ventilation effectiveness
- Construction IAQ management plans
- Low-emitting materials
- Indoor chemical and pollutant source control
- Controllability of systems
- Thermal comfort
- Daylight & views

6. Innovation and Design Process:
   - Maximize benefits of green planning by addressing issues at initial stages of a project

APPENDIX THREE

TERMINOLOGY

Charrette

A short and intensive design process that usually involves people from different backgrounds and disciplines in order to gain an integrated and broad perspective of issues at hand. The charrette process consists of focused workshop(s) which take place in the early phase of the design process. All project team members meet together to exchange ideas, encouraging generation of integrated design solutions.

Commissioning

Commissioning is a systematic process of ensuring that the performance of the building and its systems meet the design intent and the owner/occupants functional and operational needs. The process should: document the design intent; identify and perform tests that show the whole building and its systems meet the owner's functional requirements; provide a comprehensive and appropriate basis for training building operation and maintenance personnel.

Daylighting

A method of illuminating building interiors with natural light so that the use of artificial lighting is reduced in the day time. Common daylighting strategies include the proper orientation and placement of windows, use of light wells, light shafts or tubes, skylights, light shelves, reflective surfaces and shading, and the use of interior glazing to allow light into adjacent spaces.

Ecological Footprint

The ecological impact of human activities as measured in terms of the area of biologically productive land and water required to produce the goods consumed and to assimilate the wastes generated.

Embodied Energy

A representation of the energy used to grow, harvest, extract, manufacture, transport, and dispose of a material.

Energy modeling

A computer model that analyzes the building's energy-related features in order to project the energy consumption of a given design.

Greenhouse Gases

Chemical compounds in earth's atmosphere that allow sunlight to enter the atmosphere freely. When sunlight strikes the earth's surface, some of it is reflected back toward space as infrared radiation (heat). Greenhouse gases absorb this infrared radiation and trap the heat in the atmosphere. Many gases exhibit these "greenhouse" properties. Some of them are water vapour, carbon dioxide, methane, and nitrous oxide, and gases used for aerosols.

Harvested rainwater

The rain that falls on a roof and I channeled by gutters to a storage tank or cistern. The uses of this water depend on the quality and the type of pollutants picked up from the roof surface. Often it is used for irrigation.

Integrated Design

An approach where the design of each system takes into account and balances the design of other systems. Often an interdisciplinary approach, integrated design should begin at the earliest stage of a project with a guiding set of principles

Leadership in Energy and Environmental Design (LEED)

The LEED green building rating system is a set of performance standards where credits are earned for satisfying each criterion. The standards are based on accepted energy and environmental principles and aims to achieve a balance between known effective practices and emerging concepts. Four levels of LEED certification are possible; depending on the number of criteria met, and indicate increasingly high performance building practices:

- LEED Certified 26-32 points
- LEED Silver 33-38 points
- LEED Gold 29-51 points
- LEED Platinum 52+ points

Living Machine

An ecologically engineered waste water treatment system: It is a solar powered, accelerated version of the water treatment facilities found in mature natural systems. Incorporating helpful microbes, plants, snails and fish into diverse, self-organizing and responsive communities. Living machine systems are site-specific, biological solutions that re-route waste water streams into resources.

Life cycle assessment

The comprehensive examination of a product's environmental and economic aspects and potential impacts throughout its lifetime, including raw material extraction, transportation, manufacturing, use and disposal.

Life cycle cost

The amortized annual cost of a product, including capital costs, installation costs, operating cost, maintenance costs, and disposal costs discounted over the lifetime of a product.

Photovoltaics

Photovoltaics (PV's) are solid state cells, typically made from silicon, that directly convert sunlight into electricity.

Sustainable

Of, relating to, or being a method of harvesting or using a resources so that the resource is not depleted or permanently damaged. 2. Relating to a human activity that can be sustained over the long term, without adversely affecting the environmental conditions (soil conditions, water quality, climate) necessary to support those same activities in the future.

Volatile organic compounds (VOCs)

VOCs are chemicals that contain carbon molecules and are volatile enough to evaporate from material surfaces into indoor air at normal room temperatures (referred to as off-gassing). Examples of building materials that may contain VOCs include, but are not limited to: solvents, paints, adhesives, carpeting and particleboard. Signs or symptoms of VOCs exposure may include eye and upper respiratory irritation, nasal congestion, headache and dizziness.

Whole building design

Whole building design considers all building components and systems during the design phase and integrates them to work together. The whole-building philosophy considers site, energy, materials, indoor air quality, acoustics, natural resources, and their interrelation.

APPENDIX FOUR

ONLINE RESOURCES

Sustainable Development Resources

Canada Green Building Council	www.cagbc.org
Center for a New American Dream	http://www.newdream.org
Center for Sustainable Systems	http:/css.snre.umich.edu/
Campus Ecology Project of the National Wildlife Federation	www.nuf.org/campusecology
Higher Education Climate Action Project (HECAP)	www.heclimateaction.org
Blueprint for a Green Campus	www.envirocitizen.org/blueprint/
Higher Education Network for Sustainability and the Environment	http://www.ulsf.org/hense/
Talloires declaration	www.ulsf.org/programs_talloires.html
Rocky Mountain Institute	http://www.rmi.org
Second Nature	http://secondnature.org
World Resources Institute	http://wri.org
US Green Building Council	http://usgbc.org/
Energy Star Program	http://www.energystar.gov/
Environmental Building News	www.buildinggreen.com
Education for Sustainability Western Network	www.efswest.org
Centre for Renewable Energy and Sustainability Technology	http://solstice.crest.org
Sustainability Now	www.sustainability.ca
UN Habitat Best Practices Database	www.bestpractices.org
Sustainable Building Sourcebook	www.greenbuilder.com/sourcebook
Cities for Climate Protection	http://ccp.iclei.org
Dockside Green (Victoria)	www.docksidegreen.ca

Planning/Design Organizations

Canadian Institute of Planners	www.cip-icu.ca
Planning Institute of BC	www.pibc.bc.ca
Architectural Institute of B.C	www.aibc.ca
American Planning Association	www.planning.org
Society for College and University Planning	http://scup.org/
University Leaders for a Sustainable Future	http://www.ulsf.org/
Association of Higher Education Facilities Officers	www.appa.org
The Council of Educational Facility Planners	www.cefpi.com