a place of mind

THE UNIVERSITY OF BRITISH COLUMBIA

RESIDENTIAL ENVIRONMENTAL ASSESSMENT PROGRAM (REAP)

Make UBC a living laboratory in environmental and social sustainability by integrating research, learning, operations, and industrial and community partners.
UBC Place and Promise - Goal

Create a vibrant and sustainable community of faculty, staff, students and residents.
UBC Place and Promise - Goal

As part of its responsibility as an educational and research institution and as a signatory to both the Halifax Declaration and the Talloires Declaration by the University Presidents for a Sustainable Future, UBC provides leadership by demonstrating the means to a sustainable community on campus.
UBC Policy #5 – Sustainable Development

UBC's goal is "to utilize its land resource to support academic activities and to build an endowment through the development of an integrated community in an environmentally sound fashion, consistent with regional objectives."
UBC Land Use Plan

This vision is about a university community, and adjacent park, that strives to balance ecological health, economic viability, and community. These components are all equally valued and, through careful planning, will lead to a community that will serve as a model for living, working and learning in harmony.
UBC Land Use Plan – Vision

IEQ MANDATORY

IEQ Credit M2: Paints and Coatings — Mandatory

Requirement

Specify and use paints and coatings that carry an EcoLogo label or are rated at a minimum GPS-1 by the Master Painter's Institute on the interior of the building.

Intent

To reduce the quantity of indoor air contaminants that are odorous or potentially irritating or harmful to the comfort and health of installers and occupants.

Rationale

Paints and coatings contain organic and inorganic compounds or materials that may adversely impact human health and the atmosphere by releasing solvents or other toxic materials at various stages of the product life cycle.

Definitions

- *Low-Emitting Materials:* Materials containing compounds that do not evaporate at room temperature.
- *Volatile Organic Compounds (VOC):* Carbon-containing compounds that evaporate readily at room temperature.

Strategies

- Specify low VOC paints and coatings in construction documents, and ensure specifications are clearly stated in each section where these materials are addressed.
- Schedule field monitoring to ensure that only paints and coatings meeting the criteria are used.

Resources

- *Master Painter's Institute*: The Institute provides information on the practical and technical aspects of paints and coatings and their professional application. The 'Specify Green' section contains the MPI rating system for identifying low-emitting paints.

  Site: http://www.paintinfo.com/
- *Environmental Choice Program/Ecologo:* The EcoLogo is a registered trademark of Environment Canada and is part of the Environmental Choice Program. EcoLogo designates products that have met specific environmental performance criteria.

  Site: http://www.ecologo.org/en/index.asp

Documentation: *Submit at the Occupancy Permit phase*

- Letter signed by Architect declaring that the requirements have been met.
- Manufacturer's cut sheet indicating VOC content of all paints and coatings used on the interior of the building.

IEQ MANDATORY

IEQ Credit M3: Carpet — Mandatory

Requirement

Specify and install carpet and carpet cushion that carry the following certifications: Carpet and Rug Institute Green Label Plus *or* Ecologo certification.

Intent

To reduce the quantity of indoor air contaminants that are odorous or potentially irritating or harmful to the comfort and health of installers and occupants.

Rationale

Carpets are sources of volatile organic compounds (VOCs), dust, and fibre release.

Definitions

- *Volatile Organic Compounds (VOC):* carbon-containing compounds that evaporate readily at room temperature.

Strategies

- Specify low-VOC carpets in construction documents.
- Ensure that VOC limits are clearly stated in each specification section where carpets are addressed.
- Tack in-suite carpets instead of gluing. Carpet in public/common areas should be adhered using low-VOC adhesives.

Resources

- *Carpet and Rug Institute Green Label Indoor Air Quality Test Program:* The program designates products that have been tested by an independent laboratory and have met criteria for very low emissions. The program covers: carpet, cushion and adhesives.

  Site: http://www.carpet-rug.com/
- *Environmental Choice Program/Ecologo:* The EcoLogo label is a registered trademark of Environment Canada and is part of the Environmental Choice Program. EcoLogo designates products that have met specific environmental performance criteria.

  Site: http://www.ecologo.org/en/certifiedgreenproducts/

Documentation: *Submit at the Occupancy Permit phase*

- Letter signed by Architect declaring that the requirements have been met.
- Certification documentation for products selected.

IEQ MANDATORY

IEQ Credit M4: Ventilation Effectiveness — Mandatory

Requirement

Prepare and implement an effective air management strategy that meets the requirements of the current versions of CAN/CSA F326 or ASHRAE-62.1 or 62.2 as applicable to the building configuration.

Intent

To remove indoor air contaminants such as moisture and odours from kitchens and bathrooms, and to ensure adequate levels of outdoor airflow.

Rationale

New construction techniques and materials have led to buildings that are more tightly built, making adequate ventilation all the more critical. Inadequate ventilation can lead to high humidity levels, and can cause combustion gases from unsealed heating equipment to be released into the building.

Strategies

- Consult ASHRAE 62.1, 62.1 or and CSA F326 for detailed design strategies that support ventilation system planning to promote healthy indoor air quality levels. The systems clearly define adequate levels of air changes per hour.
- Proper equipment sizing including air handlers, coils, ducting, and fans are key elements in the overall system design, and should supply the outdoor airflow requirements for each zone in the building.
- During the design phase, pay particular attention to system and equipment components that curb indoor air contaminants at their source such as HEPA filters.
- During the design phase, ensure that system components such as ducts, plenums, and coils are readily accessible for regular cleaning and maintenance.
- Avoid locating outdoor-air intakes near point sources of contaminants such as vehicle emissions, cooling tower drift, or flue vents.
- Ensure that indoor air contaminated by building functions such as copiers, chemical storage, or combustion processes is exhausted locally, and is not allowed to mix with indoor return air.

Resources

- *Canadian Standards Agency (CSA):* The CSA standard details ventilation standards for buildings and can be found on their website.

  Site: http://www.csa.ca/cm/ca/en/home
- *American Society of Heating Refrigerating and Air Conditioning Engineers:* ASHRAE develops ventilation standards for worldwide use, including the ASHRAE 62 standard, which specifies ventilation standards for multi-unit residential buildings. The standard is available through ASHRAE's website.

  Site: https://www.ashrae.org/

Documentation: *Submit at the Building Permit phase*

- Letter signed by Mechanical Engineer declaring that the requirements will be met.
- Description of ventilation system and fresh air management strategies employed.

IEQ 1 – LOW-EMITTING MATERIALS

IEQ Credit 1.1: Low VOC Paints and Coatings — 2 points

Requirement

Specify and use paints and coatings rated a minimum GPS-2 by the Master Painter's Institute on the interior of the building.

Intent

To reduce the quantity of indoor air contaminants that are odorous or potentially irritating or harmful to the comfort and health of installers and occupants.

Rationale

Paints and coatings contain organic and inorganic compounds or materials that may adversely impact human health and the atmosphere by releasing solvents or other toxic materials at various stages of the product life cycle.

Definitions

- *Low-Emitting Materials:* Materials containing compounds that do not evaporate at room temperature.
- *Volatile Organic Compounds (VOC):* Carbon-containing compounds that evaporate readily at room temperature

Strategies

- Specify GPS-2 paints in construction documents, and ensure specifications are clearly stated in each section where paints are addressed.
- Schedule field monitoring to ensure that only paints and coatings meeting the criteria are used.

Resources

- *Master Painter's Institute*: The Institute provides information on the practical and technical aspects of paints and coatings and their professional application. The 'Specify Green' section contains the MPI rating system for identifying low-emitting paints.

  Site: http://www.paintinfo.com/

Documentation: *Submit at the Occupancy Permit phase*

- Letter signed by Architect declaring that the requirements have been met.
- Manufacturer's cut sheet indicating VOC content of all paints and coatings used on the interior o the building.

IEQ 1 – LOW-EMITTING MATERIALS

IEQ Credit 1.2: Low-Emitting Composite Wood Products 2 points

Requirements

Specify and install interior composite wood products, such as flooring, doors, trim, etc., that have no added urea formaldehyde. Cabinetry is excluded form this credit.

Intent

To reduce the quantity of indoor air contaminants that are odorous or potentially irritating or harmful to the comfort and health of installers and occupants.

Rationale

Urea formaldehyde is a volatile organic compound (VOC) that a product can off-gas over its lifetime. The International Agency for Research on Cancer (IARC) considers formaldehyde a human carcinogen, a key factor in the material's implications for human health over the long-term. VOC's have short-term health implications as well, such as eye, nose and throat irritation, and headaches and nausea.

Definitions

- *Volatile Organic Compounds (VOC):* Carbon-containing compounds that evaporate readily at room temperature.

Strategies

- Contact local suppliers early to determine availability of interior composite wood products that are urea-formaldehyde free.

Resources

- *Composite Panel Association and Composite Wood Council:* Provides comprehensive information on composite panel and wood.

  Site: http://www.pbmdf.com/
- *International Agency for Research on Cancer (IARC):* The objective of the IARC is to promote international collaboration in cancer research.

  Site: http://www.iarc.fr/
- *Print Media: LEED Canada for New Construction and Major Renovations 2009:* Information and resources for Indoor Environment Quality Credit 4.4.

Documentation: *Submit at the Occupancy Permit phase*

- Letter signed by Architect declaring that the requirements have been met.
- Manufacturer's cut sheet indicating each interior composite wood product contains no added urea formaldehyde.

IEQ 1 – LOW-EMITTING MATERIALS

IEQ Credit 1.3: Low-emitting Insulation 2 points

Requirements

Specify and install formaldehyde free insulation on the interior of the building.

Intent

To reduce the quantity of indoor air contaminants that are odorous or potentially irritating or harmful to the comfort and health of installers and occupants.

Rationale

Formaldehyde is a volatile organic compound (VOC) that a product can off-gas over its lifetime. The International Agency for Research on Cancer (IARC) considers formaldehyde a human carcinogen, a key factor in the material's implications for human health over the long-term. VOC's have short-term health implications as well, such as eye, nose and throat irritation, and headaches and nausea.

Definitions

- *Volatile Organic Compounds (VOC):* Carbon-containing compounds that evaporate readily at room temperature.

Strategies

- Contact local suppliers early to determine availability of insulations and drywall that are formaldehyde free.

Resources

- *International Agency for Research on Cancer (IARC):* The objective of the IARC is to promote international collaboration in cancer research.

  Site: http://www.iarc.fr/

Documentation: *Submit at the Occupancy Permit phase*

- Letter signed by Architect declaring that the requirements have been met.
- Manufacturer's cut sheet indicating each product selected is urea-formaldehyde free.

IEQ 1 – LOW-EMITTING MATERIALS

IEQ Credit 1.4: Low-Emitting Cabinetry — 2 points

Requirement

Specify and install interior cabinetry (doors, boxes, counters and laminating adhesives) that contain no added urea formaldehyde.

Intent

To reduce the quantity of indoor air contaminants that are odorous or potentially irritating or harmful to the comfort and health of installers and occupants.

Rationale

Urea formaldehyde is a volatile organic compound (VOC) that a product can off-gas over its lifetime. The International Agency for Research on Cancer (IARC) considers formaldehyde a human carcinogen, a key factor in the material's implications for human health over the long-term. VOC's have short-term health implications as well, such as eye, nose and throat irritation, and headaches and nausea.

Definitions

- *Volatile Organic Compounds (VOC):* Carbon-containing compounds that evaporate readily at room temperature.
- *Carcinogen:* A substance that is an agent in directly causing cancer.

Strategies

- Contact local suppliers early to determine availability of cabinetry that is urea-formaldehyde free.
- Consider using low-VOC finishes for all cabinetry sealants, finishing materials, and millwork.

Resources

- *Composite Panel Association and Composite Wood Council:* Provides comprehensive information on composite panel and wood.

  Site: http://www.pbmdf.com/
- *International Agency for Research on Cancer (IARC):* The objective of the IARC is to promote international collaboration in cancer research.

  Site: http://www.iarc.fr/

Documentation: *Submit at the Occupancy Permit phase*

- Letter signed by Architect declaring that the requirements have been met.
- Manufacturer's cut sheet indicating each product selected contains no added urea formaldehyde.

Construction (CON)

CON MANDATORY

CON Credit M1: Staging and Construction — Mandatory

Requirements

Prepare and implement a Staging and Construction Plan, including alternate detour information and signage for pedestrians and cyclists.

Intent

To protect the ecology and natural features of the site such as topography, watercourses, flora and fauna from damage during the construction process.

Rationale

The construction process can be highly damaging to natural systems on the site. Although these effects cannot be completely avoided, protecting adjacent areas and vegetation from construction activity and debris can help to minimize the overall impact.

Definitions

- *Staging and Construction Plan:* A plan that establishes where and how construction materials and equipment will be temporarily stored on or near the construction site.

Strategies

- Identify staging and equipment storage areas in designated areas that are away from trees and vegetation, and that will cause minimal compaction of soils to be landscaped.
- Establish clearly marked construction and disturbance boundaries; delineate lay-down, recycling and disposal areas; and use areas to be paved as staging areas.
- Reduce the development footprint as much as possible, including building(s), access roads and parking.
- Limit site disturbance by using protective fencing.
- Designate washout area for concrete trucks in a non-disruptive area.
- Do not nail signs, utility boxes or fencing to trees.

Resources

- *UBC Strategic Transportation Plan:* The Strategic Transportation Plan describes UBC's policies for managing all automobile traffic on campus, including requirements and strategies for managing truck traffic during construction.

  Site: http://transportation.ubc.ca/transportation-planning/files/2010/08/STP2005_14_July05_Approved.pdf

Documentation: *Submit at the Occupancy Permit phase*

- Letter signed by Developer declaring that the requirements have been met.
- Copy of staging and construction plan.

CON MANDATORY

CON Credit M2: Vegetation Safeguards and Land-Clearing Debris — Mandatory

Requirements

Prepare a site plan showing the sizes and locations of vegetation to be removed, retained and salvaged, including plants located on adjacent public rights-of-way ***and*** develop a plan to effectively handle debris from land clearing and divert it from landfill disposal.

Intent

To protect the ecology and natural features of the site such as topography, watercourses, flora and fauna from damage during the construction process.

Rationale

The construction process can be highly damaging to natural systems on the site. Although these effects cannot be completed avoided, protecting adjacent areas and vegetation from construction activity and debris can help to minimize the overall impact.

Strategies

- Carefully survey the site prior to building and map existing site vegetation. Where possible, retain all significant trees and natural features and preserve natural slopes and the existing direction of water flow across the site.
- Prepare a site plan showing the sizes and locations of vegetation to be removed, retained and salvaged, including plants located on adjacent public rights-of-way.
- Protect the root zones of saved trees. Protection of existing significant trees should be substantial, visible and extend to at least the full perimeter of the tree canopy (the "drip line").
- Remove and stockpile topsoil, and where suitable, strip groundcover and shrubs for reuse after construction.
- Develop a plan to effectively handle debris from land clearing and divert from landfill disposal.
- Eliminate the use of pesticides in the preparation of the site to the greatest extent possible.

Resources

- *UBC Strategic Transportation Plan:* The Strategic Transportation Plan describes UBC's policies for managing all automobile traffic on campus, including requirements and strategies for managing truck traffic during construction.

  Site: http://transportation.ubc.ca/transportation-planning/files/2010/08/STP2005_14_July05_Approved.pdf

Documentation: *Submit at the Occupancy Permit phase*

- Letter signed by Developer declaring that the requirements have been met.
- Copy of vegetation site plan.
- Copy of debris and land clearing management plan.

CON MANDATORY

CON Credit M3: Truck Management Plan — Mandatory

Requirement

Prepare and implement a comprehensive truck management plan for the project that conforms to the *UBC Strategic Transportation Plan* and the *Neighbourhood Plan Development Guidelines*.

Intent

To manage truck traffic through residential neighbourhoods and control the frequency with which designated routes are used to reach the project site.

Rationale

Heavy truck traffic contributes to noise and air pollution in residential neighbourhoods. Truck traffic routing is necessary to minimize impacts on neighbourhoods surrounding the development site.

Definitions

- *Truck Management Plan:* A plan that identifies how truck traffic will be managed to disperse and minimize adverse impacts during project construction.

Strategies

- Contact UBC Properties Trust to develop a truck management plan for construction projects.
- Minimize truck trips by using pup or transfer trailers and by reusing materials on site where possible.
- Disperse truck traffic among the designated truck routes that connect to UBC.

Resources

- *UBC Strategic Transportation Plan:* The Strategic Transportation Plan describes UBC's policies for managing all automobile traffic on campus, including requirements and strategies for managing truck traffic during construction.

  Site: http://transportation.ubc.ca/transportation-planning/files/2010/08/STP2005_14_July05_Approved.pdf
- *UBC Neighbourhood Plans:* Each UBC neighbourhood has its own development plan. Where specified, truck management plan requirements must be adhered to during construction.

  *Site:*http://www.planning.ubc.ca/vancouver_home/plans_and_policies/land_use_planning/ubc_neighbourhood_plans.php

Documentation: *Submit at the Occupancy Permit phase*

- Letter signed by Developer declaring that the requirements have been met.
- Copy of truck management plan.

CON MANDATORY

CON Credit M4: Wheel Wash — Mandatory

Requirement

Provide a wheel wash for vehicles leaving the site *or* a street cleaning program and catch basin protection.

Intent

To reduce the amount of soil and other solids leaving the site during excavation and entering into the storm water system.

Rationale

Construction vehicles can transport significant amounts of water contaminants off the site, including sediments, concrete, lubricants, fuels, solvents, fertilisers and pesticides. If allowed to enter storm drains, these contaminants may pollute water systems with silt, change the chemical balance, or remove dissolved oxygen.

Definitions

- *Wheel Wash:* A temporary or permanent installation that uses an immersion bath or water spray to remove mud, soil, rock, debris and other materials from the tires and undercarriages of vehicles.
- *Street Cleaning Program:* Cleaning programs establish schedules for sweeping based on the rate of debris accumulation and the anticipated frequency of rain events.
- *Catch Basin Protection:* Stormwater systems can be protected from sediment and pollutant loads with filtering materials installed in the catch basin system. A catch basin is an inlet from the street to the storm drain system that typically includes a grate and a sump to capture sediment.

Strategies

- Consult with UBC Properties Trust to determine whether truck traffic will be heavy enough to require a wheel wash.
- For street cleaning, identify and focus on priority areas where debris will most likely accumulate and produce the highest contaminant loads. Determine sweeping frequency based on the rate of debris accumulation and the frequency of rain events.
- Protect catch basins with filtering products that will prevent pollutants from entering storm drains.

Resources

- *Best Management Practices Guide for Stormwater:* This BMP guide, developed by Metro Vancouver, provides comprehensive information on stormwater management practices including wheel wash, street cleaning and catch basin protection.

  Site: http://www.metrovancouver.org/services/wastewater/sources/Pages/StormwaterManagement.aspx

Documentation: *Submit at the Occupancy Permit phase*

- Letter signed by Developer declaring that the requirements have been met.

CON MANDATORY

CON Credit M5: Erosion and Sedimentation Control Mandatory

Requirement

Prepare and implement a Sediment and Erosion Control Plan that conforms to *Best Management Practices Guide for Stormwater: Appendix H – Construction Site Erosion and Sediment Control Guide* (GVS&DD, October 1999).

Intent

To control on-site erosion to reduce negative impacts on water and air quality.

Rationale

Prevent loss of soil during construction by stormwater runoff and/or wind erosion by taking measures to protect topsoil by stockpiling for reuse. Prevent sedimentation of storm sewer or receiving streams and/or air pollution with dust and particulate matter.

Definitions

- *Soil erosion:* The removal and loss of soil by the action of water, ice, gravity or wind.
- *Sedimentation:* The settling out of soil particles transported by water.
- *Sediment and Erosion Control Plan:* A plan that encompasses all applicable stabilisation strategies required to limit sediment and erosion during construction, including:
    - A statement of erosion control and stormwater control objectives;
    - A comparison of post-development stormwater runoff conditions with predevelopment conditions;
    - A description of all temporary and permanent erosion control and stormwater control measures implemented on the project site; and
    - A description of the type and frequency of maintenance activities required for erosion control

Strategies

- Consult UBC and the Metro Vancouver for recommended measures to mitigate erosion and promote sedimentation control.

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Resources

- *BC Ministry of Environment:* The Ministry provides a wide range of publications that support ecologically sensitive site development, including *"Stormwater Planning: A Guidebook for British Columbia, Chapter 7:Site Design Solutions for Achieving Performance Targets"*

  Site: http://www.env.gov.bc.ca/epd/mun-waste/waste-liquid/stormwater/

- *Best Management Practices Guide for Stormwater: Appendix H – Construction Site Erosion and Sediment Control Guide:* Greater Vancouver Sewerage and Drainage District, October 1999.

  Site: http://www.metrovancouver.org/services/wastewater/sources/Pages/StormwaterManagement.aspx

Documentation: *Submit at the Occupancy Permit phase*

- Letter signed by the Civil Engineer or responsible party declaring that the requirements have been met
- Copy of the Erosion and Sedimentation Control Plan.

CON MANDATORY

CON Credit M6: Waste Management Plan — Mandatory

Requirement

Prepare and implement a Waste Management Plan that diverts 75% (by weight) of construction and demolition waste from landfill.

Intent

To divert construction and demolition from landfill disposal, to redirect recyclable material back to the manufacturing process, and to reclaim reusable construction materials for future use.

Rationale

Although actual waste reduction quantities and techniques will vary by site (based on materials used, local recycling markets and other conditions), builders can manage wastes safely and effectively while diverting the maximum possible amount of construction waste from disposal.

Definitions

- *Waste Management Plan:* A document prepared in advance of construction that details how construction waste will be managed throughout the project. Plans include specific instructions to crews and subcontractors on material separation and handling procedures.

Strategies

- Consider on-site separation and recycling of cardboard, metals, brick, concrete, plastic, clean wood, glass, gypsum wallboard, carpet, and insulation.
- Designate a specific area on the construction site for recycling, and track recycling efforts throughout the construction process.
- Identify construction haulers and recyclers to handle the designated material.

Resources

- Metro Vancouver's Demolition, Land Clearing and Waste Management Toolkits.
  Site: http://vancouver.ca/home-property-development/green-demolition-practices.aspx
- *Print Media: LEED Canada for New Construction and Major Renovations 2009:* Information and resources for Materials & Resource Credit 2.

Documentation: *Submit at the Occupancy Permit phase*

- Letter signed by Contractor declaring that the requirements have been met.
- Copy of construction Waste Management Plan and hauling summary demonstrating 75% diversion.

CON 1 – CONSTRUCTION INDOOR AIR QUALITY MANAGEMENT PLAN

CON Credit 1.1: Indoor Air Quality Management Plan 2 points

Requirement
Prepare and implement an Indoor Air Quality (IAQ) Management Plan for the construction and pre-occupancy phases of the building.

Intent
To prevent indoor air contamination resulting from the construction process that is odorous or potentially irritating or harmful to the comfort and health of installers and occupants.

Rationale
Building construction inherently includes activities that can contaminate buildings and subsequently impact indoor air quality well after the building is occupied. Construction management strategies and procedures can be instituted during construction that can reduce levels or indoor air contamination.

Definitions
- *Indoor Air Quality Management Plan:* A document specific to a building project that outlines measures to minimize contamination in the building during construction.
- *Absorptive Construction Materials:* Porous construction and finishing materials that can collect air pollutants and later release them into occupied spaces.

Strategies
- Protect the ventilation system ducting during construction, control pollutant sources, and interrupt pathways for contamination.
- Protect stored on-site or installed absorptive construction materials from moisture damage, and sequence installation to avoid contamination of absorptive materials such as carpets.
- Require a cessation of indoor smoking site policy as soon as drywall is delivered.
- Clean interiors, building cavities, ventilation systems and components, and replace filtration media prior to occupancy.

Resources
- *Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guideline for Occupied Buildings under Construction 2nd Edition 2007*: Provides an overview of air pollutants associated with construction and a range of control measures.

  Site: www.smacna.org
- *Print Media: LEED Canada for New Construction and Major Renovations 2009:* Information and resources for Indoor Environment Quality Credit 3.1.

Documentation: *Submit at the Occupancy Permit phase*
- Letter signed by Contractor declaring that the requirements have been met.
- Copy of Indoor Air Quality Management Plan.

CON 1 – CONSTRUCTION INDOOR AIR QUALITY MANAGEMENT PLAN

CON Credit 1.2: Flushout / IAQ Test 2 points

Requirement

After construction ends an prior to occupancy conduct a minimum two-week continuous building flushout with new filtration media at 100% outside air *or* conduct a Baseline Indoor Air Quality Test.

Intent

To reduce the concentration of indoor air contaminants produced during construction prior to occupancy.

Rationale

Building construction inherently includes activities that produce air contaminants, which can subsequently impact indoor air quality into occupancy. Flushout procedures undertaken before occupancy expel contaminants that may have accumulated in the building during construction.

Definitions

- *Flushout*: Sustained ventilation of the building after the end of construction and prior to occupancy with new filtration media and outdoor air.
- *Baseline IAQ test:* An indoor air quality testing procedure that randomly selects sampling points to measure the maximum concentration levels for the following contaminants:
  - *Formaldehyde:* 27 ppb
  - *Particulates:* 50 mg per cubic meter
  - *TVOC:* 500 mg per cubic meter
  - *4-PCH*: 6.5 mg per cubic meter

Strategies

- Decide on a flushout plan or an IAQ testing prior to construction start.
- Develop the construction schedule to accommodate flushout or IAQ testing prior to occupancy.
- Include flushout or IAQ testing requirements in tender documents.
- Prior to IAQ testing reduce indoor air contaminant in order to achieve baseline. Retest no compliant areas.

Resources

- *EPA:* Protocols for environmental requirements for air quality.

  Site: http://www.epa.gov/indoorairplus/index.html
- *Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guideline for Occupied Buildings under Construction, 1995*: Provides an overview of air pollutants associated with construction and a range of control measures.

  Site: www.smacna.org
- *Print Media: LEED Canada for New Construction and Major Renovations 2009:* Information and resources for Indoor Environment Quality Credit 3.2.

Documentation: *Submit at the Occupancy Permit phase*

- Letter signed by Contractor declaring that the requirements have been met, including:
- Copy of specifications showing requirement for flushout or results of IAQ testing.

Innovation and Design Process (ID)

ID MANDATORY

ID Credit M1: Goal-Setting Workshop — Mandatory

Requirement

Hold a green building workshop or Design Charrette including the developer, design consultants and contractor to review and develop the strategies for achieving the development's goals and priorities relevant to the Residential Environmental Assessment Program.

Intent

To create, through consensus, a set of comprehensive environmental design goals and strategies for a project and enhance communication and interaction throughout the design process.

Rationale

Goal-setting workshops promote a collaborative vision of specific goals and priorities in the early planning stages of the project. Early consensus on environmental goals amongst key consultants and trades acts as a strong driver in achieving green building goals over the duration of the project.

Definitions

- *Integrated Design Process (IDP):* IDP involves the full design team and key stakeholders from the beginning of a building project. The group works together in a comprehensive, team-based approach with the goal of producing a successful integration of environmental systems and strategies.
- *Design Charrette:* An intensely focused workshop in which participants with a wide range of backgrounds and expertise are brought together to collaborate on a design problem.
- *Consensus:* The outcome of collaborative problem-solving where the solution is generally accepted rather than considered a grudging compromise, and that agreement is deep-rooted enough that it can stand for some time without need to revisit the issue.

Strategies

- Establish the key deliverables of the goal-setting workshop.
- Define performance goals at the outset and refer to them throughout the project.
- Examine functional requirements.
- Examine site development issues.
- Commence teamwork in the early stages of the project.

Resources

- *U.S. National Renewable Energy Laboratory (NREL):* The NREL offers a comprehensive "Handbook for Planning and Conducting Charrettes for High-Performance Projects" as well as powerpoint presentation templates and sample charrette reports.

Documentation: *Submit at the Building Permit phase*

Copy of the minutes or report from the Goal Setting Workshop clearly outlining the REAP related priorities and goals.

ID MANDATORY

ID Credit M2: Educate the Homeowner — Mandatory

Requirement

Develop a homeowner's manual that promotes sustainable behaviour and describes all of the sustainable features of the project instructing the homeowner on their proper use. This manual should be incorporated into record drawings or some form that will be accessible beyond the first generation of owner/resident.

Intent

To promote awareness and ensure proper operation and maintenance of various systems in the suite and building.

Rationale

Proper operation and maintenance is required for optimal performance of energy and water efficient technologies. A manual that explains all of the features included in a home provides building occupants with access to the information they need to ensure the technologies perform as intended.

Strategies

- Ensure all of the green features of the home are well documented and described in the homeowner's manual. Provide resources for additional information where possible.
- Proper lifetime operation and maintenance ensures installed features will meet design goals. Provide written operational instructions for all appliances and equipment, maintenance schedules, maintenance instructions, manuals, warranties, and product descriptions.
- Promote sustainable behaviour by providing information on how to minimize energy and resource use throughout the home.

Resources

- *NAHB Model Green Home Building Guidelines; National Association of Homebuilders:* In the 'Operation, Maintenance and Homeowner Education' section, the Guidelines highlight information to include in a homeowner's manual. This also constitutes material the sales staff should have mastery of.

  Site: http://www.nahbgreen.org/Guidelines/nahbguidelines.aspx

Documentation: *Submit at the Occupancy Permit phase*

- Letter signed by Developer certifying the requirements have been met.
- Copy of homeowner's manual highlighting sustainable features of the project.

ID 5 – INNOVATIVE DESIGN

ID Credits 5.1 – 5.3: Innovative Design Strategy or Exemplary Achievement 2 – 6 points

Requirement

Demonstrate exceptional performance above the requirements set by one of the existing credits ***or*** the implementation of an innovative design strategy not specifically addressed by any of the existing credits.

Intent

To provide design teams and projects the opportunity to be awarded points for exceptional performance achieving the next performance threshold above the requirements set by the UBC Residential Environmental Assessment Program criteria and/or innovative performance not specifically addressed by the program.

Rationale

Although the performance measures covered in the UBC Residential Environmental Assessment Program address a wide range of issues, it is important to continually foster innovation and provide opportunities for developers, designers and contractors to explore other possible advances.

Definitions

- *Integrated Design Process (IDP):* IDP involves the full design team and key stakeholders from the beginning of a building project. The group works together in a comprehensive, team-based approach with the goal of producing a successful integration of environmental systems and strategies.
- *Design Charrette:* An intensely focused workshop in which participants with a wide range of backgrounds and expertise are brought together to collaborate on a design problem.

Strategies

- Conduct research to identify applicable global best practices for building design, construction, commissioning, and post-occupancy evaluation.
- Consult with the design team and a green building specialist to determine where it is possible to substantially exceed a performance credit.
- Use the goal setting workshop to establish support for individual team members to take new initiatives and propose ideas for innovative strategies throughout the project, where achievable.
- Consider using the Integrated Design Process and design charrettes to identify high performance sustainable design measures that are not covered within the REAP assessment system.

Resources

- *Better Bricks:* Provides further insight into the rationale for, and steps for achieving a meaningful integrated design process.

  Site: http://www.betterbricks.com/default.aspx?pid=energyeffectivedesign
- *Print Media: LEED Canada for New Construction and Major Renovations 2009:* Information and resources for Innovation in Design Credit 1.

Documentation: *Submit at the Occupancy Permit phase*

- Submit a description of the exceptional performance or the innovative design strategy. The submission should include: a description of the requirement, the intent, a rationale, strategies used and documentation that will be submitted to support the credit achievement.