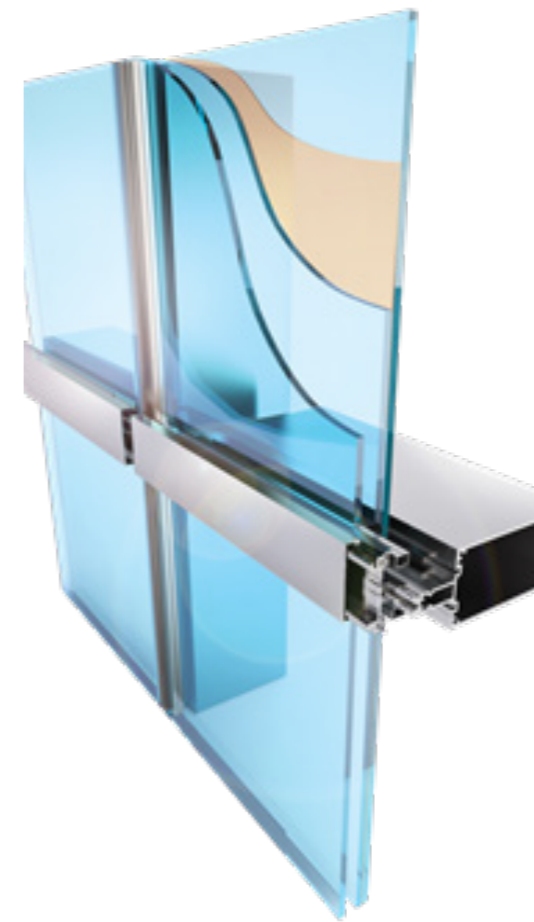


Sustainable Features



HIGH PERFORMANCE ENVELOPE [BASE ITEM]

A high performance building envelope is one that emphasizes durability and minimizes the transfer of thermal energy through the provision of well insulated walls and roofing systems as well as through the selection of appropriate glazing systems. In addition, a high performance envelope design aims to minimize air leakage and thermal bridging, effectively control water penetration, utilize thermal mass and rain screen as well as solar shading. The use of operable windows will also be examined.



BENEFITS

- " Increased Energy Efficiency
- " Reduced Carbon Footprint
- " Improved occupant comfort
- " Improved indoor air quality
- " Downsizing of heating and cooling equipment
- " Improved durability
- " Reduced long term material use and resource extraction
- " Reduced environmental pollution and waste generation
- " Reduced maintenance and replacement requirements
- " Improved long term aesthetics



DISADVANTAGES

- " Increased initial overall cost
- " Increased cost for operable windows
- " Increased ventilation requirements
- " Increased Initial Resource Use

	Rating (out of 5)
Cost (initial construction)	\$ \$ \$
Payback	Short Term
Environmental Benefit	b b b
Ease of Implementation	
Maintenance Expense	\$

High Performance HVAC Systems [BASE ITEM]

Efficient and high performance HVAC systems can have significant positive contribution to the sustainability of a project. Features that will be integrated into this project to contribute to an efficient and high performance HVAC system include; radiant heating, Variable Frequency Drives (VFD) on pumps and fans (an adjustable speed drive that controls speed and torque by varying motor input frequency and voltage, direct drive ECM motors for incremental fan systems, demand control ventilation in large assembly areas, localized HVAC systems to operate only based on occupancy and demand as well as BAS system to control all HVAC equipment.

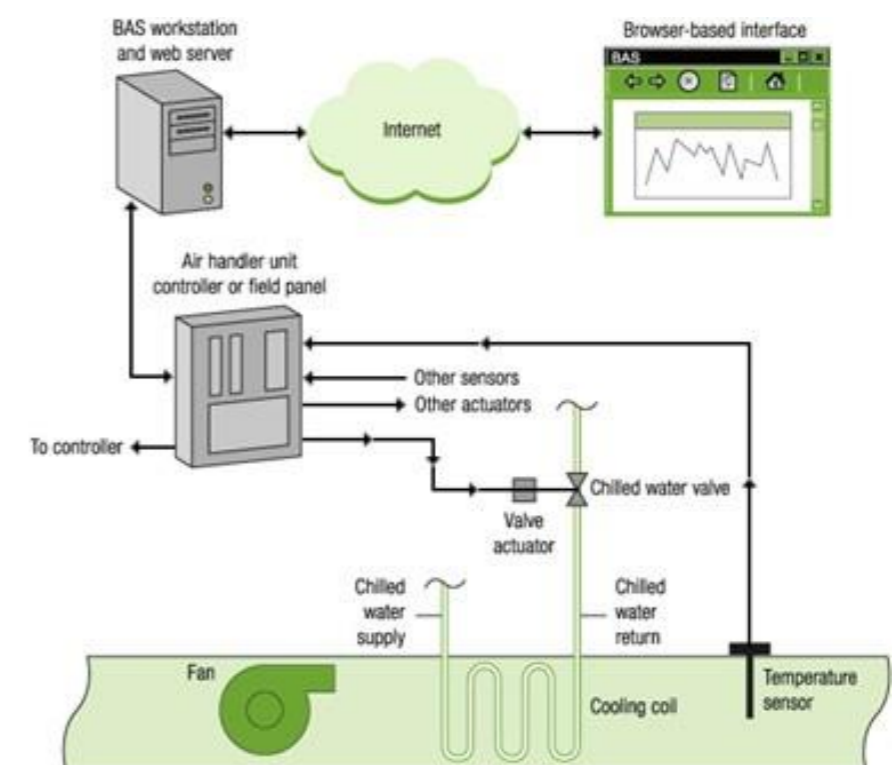


BENEFITS

- " Improved Air Quality
- " Reduced environmental pollution and waste generation.
- " Reduction of harmful emissions
- " Increased Energy Efficiency
- " Improved Occupant Comfort
- " Improved Occupant Productivity

DISADVANTAGES

- " Increased initial cost



	Rating (out of 5)
Cost (initial construction)	\$ \$
Payback	Short / Medium Term
Environmental Benefit	b b b b
Ease of Implementation	
Maintenance Expense	\$

EFFICIENT & LOW FLOW FIXTURES/APPLIANCES [BASE ITEM]

Efficient and low flow fixtures or appliances are fixtures and appliances that use significantly less energy or water than standard fixtures or appliances. Low flow or waterless fixtures can be implemented for all water using devices in a building. Efficient and low energy fixtures and appliances can include energy star rated appliances and copiers as well as LED lighting.



BENEFITS

- " Reduced Water Use
- " Reduced Carbon Footprint
- " Reduced material use and resource extraction
- " Reduced environmental pollution and waste generation
- " Increased Energy Efficiency
- " Reduced Infrastructure requirements

DISADVANTAGES

- " Increased initial cost



	Rating (out of 5)
Cost (initial construction)	\$ \$
Payback	Medium Term
Environmental Benefit	b b b
Ease of Implementation	
Maintenance Expense	N/A

MATERIALS FREE OF TOXIC CHEMICALS [BASE ITEM]

Materials that are free of toxic chemicals typically include materials that are low in Volatile Organic Compounds (VOC`s), materials that are free from added Urea-Formaldehyde as well as other materials that are free from odorous, irritating and or harmful substances. Materials with VOC`s that are typically addressed include paints, coatings, sealants and adhesives. Products that contain added formaldehyde that are usually addressed are composite wood materials (MDF, Particleboard, plywood etc.). Other materials that may contain odorous, irritating and or harmful substances include flooring and furniture systems.



BENEFITS

- " Improved Occupant comfort
- " Improved Occupant Productivity
- " Improved Health & Well-Being
- " Improved Air Quality



DISADVANTAGES

- " Increased initial cost of wood materials
- " Additional documentation tracking required



	Rating (out of 5)
Cost (initial construction)	\$ \$
Payback	N/A
Environmental Benefit	b b b b
Ease of Implementation	
Maintenance Expense	N/A

RECYCLED & REGIONAL MATERIALS [BASE ITEM]

Recycled content is the proportion by mass of pre-consumer and/or post-consumer recycled content in a material or a product. Regional materials are ones that have been extracted or harvested, processed and manufactured within a prescribed distance from the project site. Many, but not all, commonly used materials and products already contain recycled or regional material content.



BENEFITS

- " Reduced material use and resource extraction
- " Reduced environmental pollution and waste generation
- " Reduction of harmful emissions
- " Improved air quality
- " Support of local industry and jobs
- " Locally sourced materials to reduce transportation costs



DISADVANTAGES

- " Increased initial cost for some materials
- " Additional documentation and tracking required

	Rating (out of 5)
Cost (initial construction)	\$ \$
Payback	N/A
Environmental Benefit	b b b
Ease of Implementation	
Maintenance Expense	N/A

CONSTRUCTION WASTE MANAGEMENT [BASE ITEM]

Construction waste management is the diversion of construction and demolition debris from disposal in landfills to re-use or recycling. Recycled materials typically will be used as recovered resources within the manufacturing process for new products or materials. As part of construction waste management materials may be re-used either on or off site, including construction/building materials or interior elements. Construction waste management can also take the form of implementing strategies that minimize waste generation, such as prefabrication of components and assemblies or modular construction.



BENEFITS

- " Reduced material use and resource extraction
- " Reduced environmental pollution and waste generation
- " Reduction of harmful emissions
- " Reduced Infrastructure requirements
- " Improved Air Quality
- " Diverting Waste from Landfill



DISADVANTAGES

- " Increased initial cost for sorting of waste
- " Additional documentation tracking required

	Rating (out of 5)
Cost (initial construction)	\$ \$
Payback	N/A
Environmental Benefit	b b b
Ease of Implementation	
Maintenance Expense	N/A

SUSTAINABLE LANDSCAPING [BASE ITEM]

Sustainable landscaping involves designing the landscape around the city hall with the use of a diverse range of native (local), non-invasive, adaptive and drought tolerant plant species. It may also include reducing or eliminating the need for irrigation as well as minimizing the use of hardscapes, maximizing the amount of open space and incorporating urban agriculture into the design.



BENEFITS

- " Reduces water Use
- " Provides habitat for insects, pollinators & birds
- " Improves biodiversity
- " Enhances stormwater management
- " Reduces maintenance requirements
- " Reduces replacement requirements
- " Reduces use of pesticides, herbicides and fertilizers
- " Provides a connection to nature
- " Improved Health & Well-Being
- " Opportunities for Urban Agriculture
- " Educational Opportunities



DISADVANTAGES

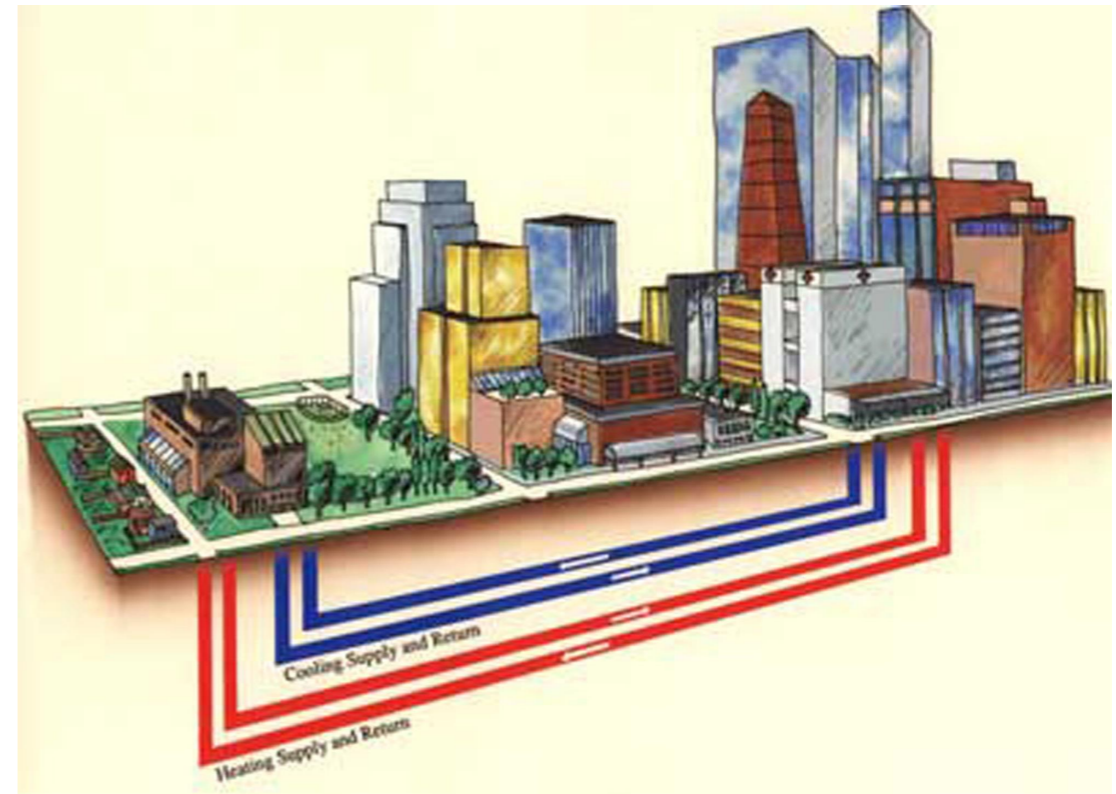
- " Urban Agriculture may not be received as compatible with a high profile public space
- " Increased potential for pest issues



	Rating (out of 5)
Cost (initial construction)	\$
Payback	Short / Medium Term
Environmental Benefit	b b b b
Ease of Implementation	
Maintenance Expense	\$

DISTRICT ENERGY SYSTEM [BASE ITEM]

A district energy system is a central heating and cooling plant for a neighbourhood or community that distributes heating and cooling energy via liquid through a network of buried insulated pipes to various buildings. District energy systems can use a variety of fuels and can be integrated with renewable or alternative energy sources.



BENEFITS

- " Improved Air Quality
- " Reduced environmental pollution and waste generation.
- " Reduction of harmful emissions
- " Reduced building Infrastructure requirements
- " Increased Energy Efficiency
- " Reduced initial cost

DISADVANTAGES

- " Lack of Control over Central Plant
- " Risk of external heating and cooling supply

	Rating (out of 5)
Cost (initial construction)	\$ \$
Payback	Medium / Long Term
Environmental Benefit	b b b
Ease of Implementation	
Maintenance Expense	\$

BICYCLE INFRASTRUCTURE [BASE ITEM]

Bicycle infrastructure involves the provision of key infrastructure that will promote and encourage cycling as an alternative mode of transportation. This typically includes providing secure bicycle storage for building visitors and occupants within close proximity to the building entrance, as well as providing shower and changing facilities within the building for occupants. Provisions can also be made for an electrical charging station for battery-powered vehicles.



BENEFITS

- " Reduction of harmful emissions
- " Improved air quality
- " Reduced material use and resource extraction
- " Reduced environmental pollution and waste generation
- " Relief of traffic congestion
- " Reduction of noise pollution
- " Reduction of infrastructure requirements (Roadways & Parking Lots)
- " Reduction of Urban Heat Island Effect
- " Promote Health & Environmental Benefit



DISADVANTAGES

- " Increased initial cost
- " Additional program space required for bicycle storage
- " Additional program space required for shower and changing facilities

Rating (out of 5)

Cost (initial construction) Exterior	\$
Cost (initial construction) Interior storage	\$ \$ \$
Payback	N/A
Environmental Benefit	b b b
Ease of Implementation	
Maintenance Expense	\$

Additional Sustainable Features [BASE ITEM]

There are many features that can be integrated into a building in order to enhance sustainability, some of the features that are being integrated into this project include the following; Hand Dryers, Drinking Fountains with bottle filler, Use of Natural Light, Demand Control Ventilation in Assembly Areas, Occupant Controlled Lighting and a Building Management System to monitor and control the building systems. The design will meet and exceed the energy efficiency requirements and codes. A high albedo/white roof and the provision for future roof-mounted alternative energy sources will be explored.



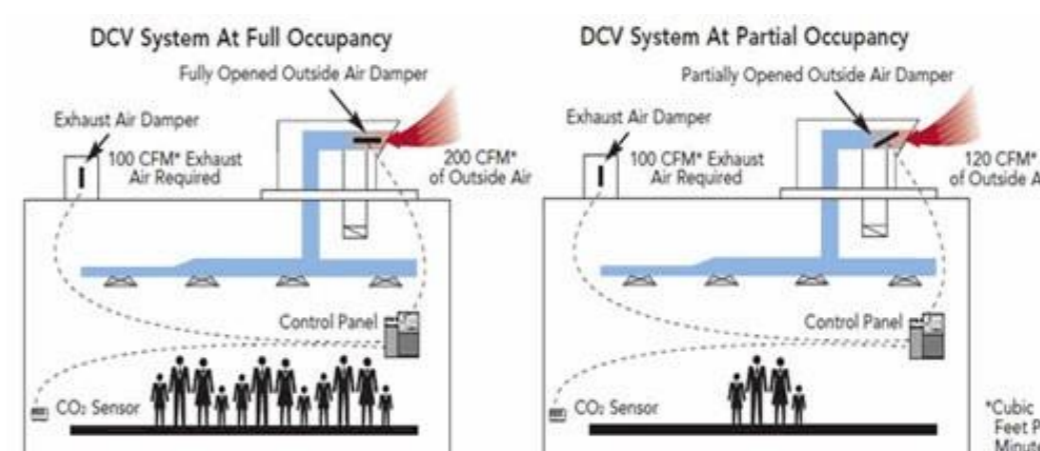
BENEFITS

- " Improved Air Quality
- " Reduced environmental pollution
- " Reduced environmental pollution and waste generation
- " Reduction of harmful emissions
- " Increased Energy Efficiency
- " Improved Occupant comfort
- " Improved Occupant Productivity
- " Reduced material use and resource extraction



DISADVANTAGES

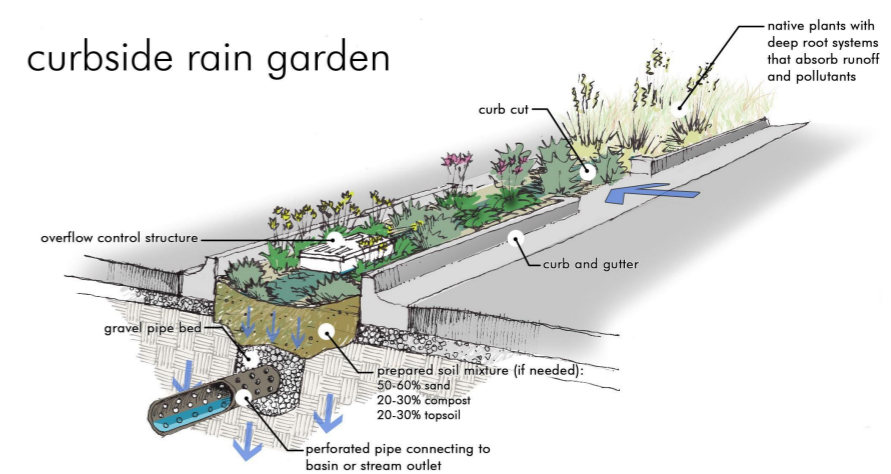
- " Increased initial cost
- " Increased initial cost to provide for future alternative energy systems



	Rating (out of 5)
Cost (initial construction)	\$ \$
Payback	Medium / Long Term
Environmental Benefit	b b b b
Ease of Implementation	
Maintenance Expense	\$ \$

STORMWATER MANAGEMENT [BASE/PROVISIONAL ITEM]

Stormwater management entails developing a plan for the building and associated site with the intention of maintaining ground water quantity, protecting or improving water quality, waterways, aquatic habitats as well as reducing erosion and flood risks. Stormwater management can come in the form of various structural or non-structural measures including flow control drains on the building roof (Base), rainwater cisterns, reduction of impervious surfaces, bio swales, filter strips, green roofing and detention or retention basins as well as various landscaping strategies (Provisional).



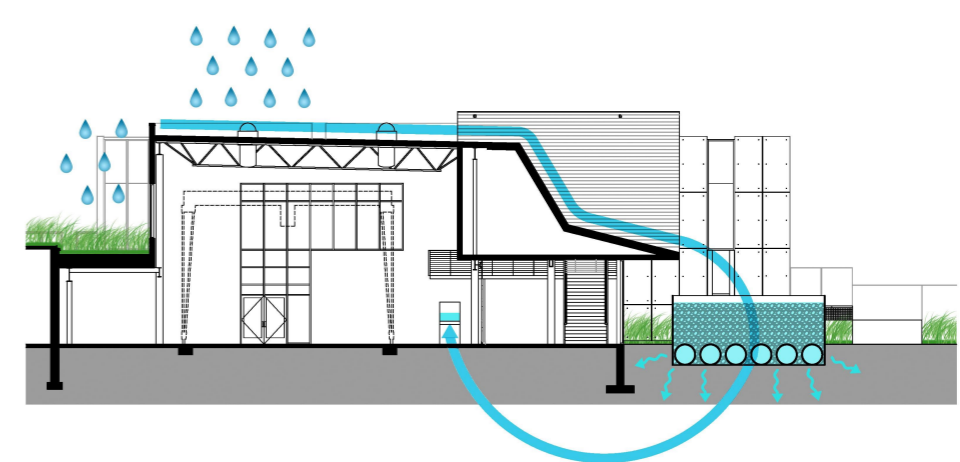
BENEFITS

- " Stormwater Management
- " Reduced environmental pollution
- " Reduced Infrastructure requirements
- " Recharge of Natural Aquifers
- " Aesthetic Improvement
- " Educational opportunities
- " Reduced Risk of Flooding



DISADVANTAGES

- " Increased initial cost for Provisional Item
- " Increased maintenance requirements



	Rating (out of 5)
Cost (initial construction)	\$ \$ \$
Payback	Medium Term
Environmental Benefit	b b b b
Ease of Implementation	
Maintenance Expense	\$ \$ \$

DAYLIGHTING [PROVISIONAL ITEM]

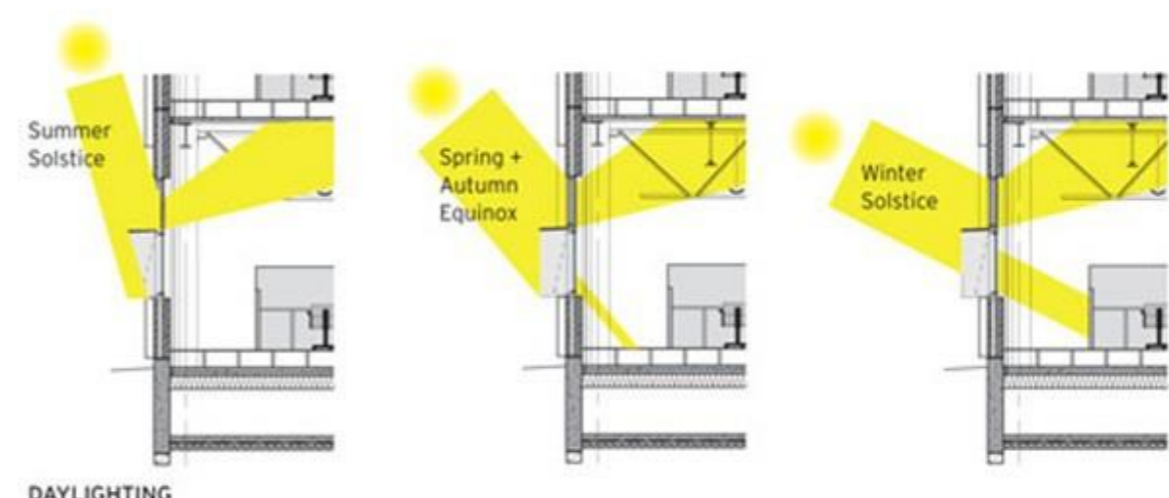
Daylighting is the provision of sufficient natural light in a building to reduce the amount of artificial light required to perform tasks and utilize a space. Typically, daylighting strategies require the design of a thin and narrow floor plan as well as the provision of adequate and appropriately designed glazing systems to allow natural light to enter the building. Daylighting strategies are typically accompanied by daylighting controls and sensors that will adjust artificial light levels within the building based on the amount of daylight. Additionally, in order to control glare, a number of strategies including strategic placement of glazing and interior furniture systems along with the use of exterior or interior shading devices is required. Low-glare can be utilized on all exterior finishes to minimize adverse effects to birds.

BENEFITS

- " Reduced Carbon Footprint
- " Increased Energy Efficiency
- " Improved Occupant comfort
- " Improved Occupant Productivity
- " Reduced environmental pollution

DISADVANTAGES

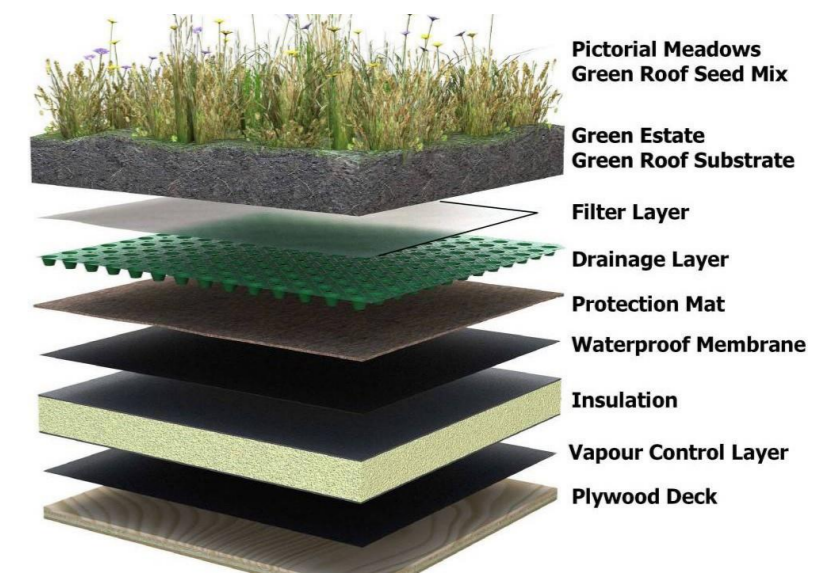
- " Increased risk to birds if glass is not treated
- " Increased potential for glare issues if shading is not implemented
- " The site limits the opportunity for a narrow floor plate
- " Increased Initial Cost



	Rating (out of 5)
Cost (initial construction)	\$ \$ \$
Payback	Medium / Long Term
Environmental Benefit	b b b
Ease of Implementation	
Maintenance Expense	\$ \$

GREEN ROOF [PROVISIONAL ITEM]

A green or living roof is a roof that is partially or completely covered by vegetation and a growing medium planted over a root barrier and waterproofing membrane it may also include a drainage layer and irrigation systems. Green roofs can either be a complete or modular system and can be intensive (all types and size of plants with deep growing medium) or extensive (low profile and limited selection of plants with shallow growing medium).



BENEFITS

- " Aesthetic Improvement
- " Stormwater Management
- " Moderation of Urban Heat Island Effect
- " Improved Air Quality
- " Amenity Space
- " Noise Reduction
- " Urban Agriculture
- " Educational opportunities
- " Improved Health & Well-Being
- " Increased Bio-Diversity



DISADVANTAGES

- " Increased initial cost for structure and system
- " Increased maintenance requirements
- " Increased potential for pest issues
- " Increased risk to birds if glass not treated
- " Increased use of water depending on design



	Rating (out of 5)
Cost (initial construction)	\$ \$ \$ \$
Payback	Medium / Long Term
Environmental Benefit	b b b b
Ease of Implementation	
Maintenance Expense	\$ \$ \$

SUSTAINABLE FURNITURE SYSTEMS [PROVISIONAL ITEM]

Sustainable furniture is furniture that incorporates one or a number of environmentally sustainable attributes. Environmentally preferable choices include the use of low toxicity products (Low VOC and or No Added Urea Formaldehyde), products that contain recycled content or that have been locally manufactured, products that contain wood from responsibly managed forests. Sustainable furniture systems can also be ones that are re-used.



BENEFITS

- " Improved Health & Well-Being
- " Improved Air Quality
- " Reduced material use and resource extraction
- " Reduced environmental pollution and waste generation.
- " Improved Occupant comfort
- " Improved Occupant Productivity



DISADVANTAGES

- " Increased initial cost



	Rating (out of 5)	
Cost (initial construction)	\$ \$	
Payback	Medium / Long Term	
Environmental Benefit	b b b b	
Ease of Implementation		
Maintenance Expense	\$	MT+A

LIVING WALL [PROVISIONAL ITEM]

A living wall is a partially or fully vegetated wall that can be constructed on the interior of the building and can be active (integrated into the mechanical systems to partially or fully filter air) or inactive (passively filtering air). Living walls can be modular or sheet/board based with pockets to contain vegetation, they typically consist of a frame, waterproofing, modular trays or retention fabric, an irrigation system, a growing medium and a variety of vegetation. Internal planting can also be designed within moveable containers.

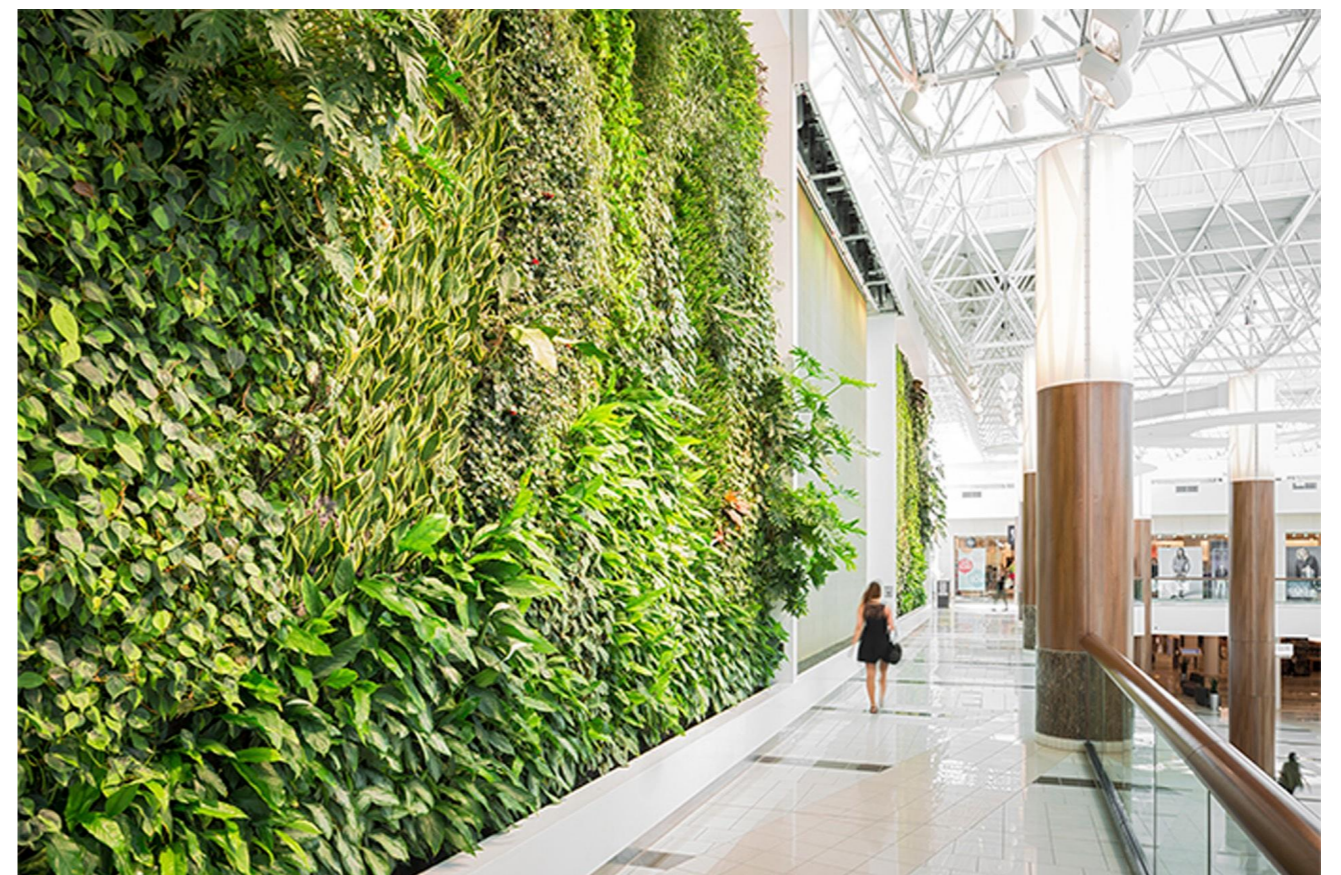


BENEFITS

- " Improved Air Quality
- " Aesthetic Improvement
- " Noise Reduction
- " Improved Health & Well-Being
- " Improved Occupant Productivity
- " Educational Opportunity

DISADVANTAGES

- " Increased initial cost
- " Additional Maintenance Requirements
- " Increased potential for pest issues
- " Potential for Increased Water Use (Irrigation)
- " Potential for Increased Energy Use (Artificial Light)



	Rating (out of 5)
Cost (initial construction)	\$ \$ \$ \$
Payback	Long Term
Environmental Benefit	b b b
Ease of Implementation	
Maintenance Expense	\$ \$

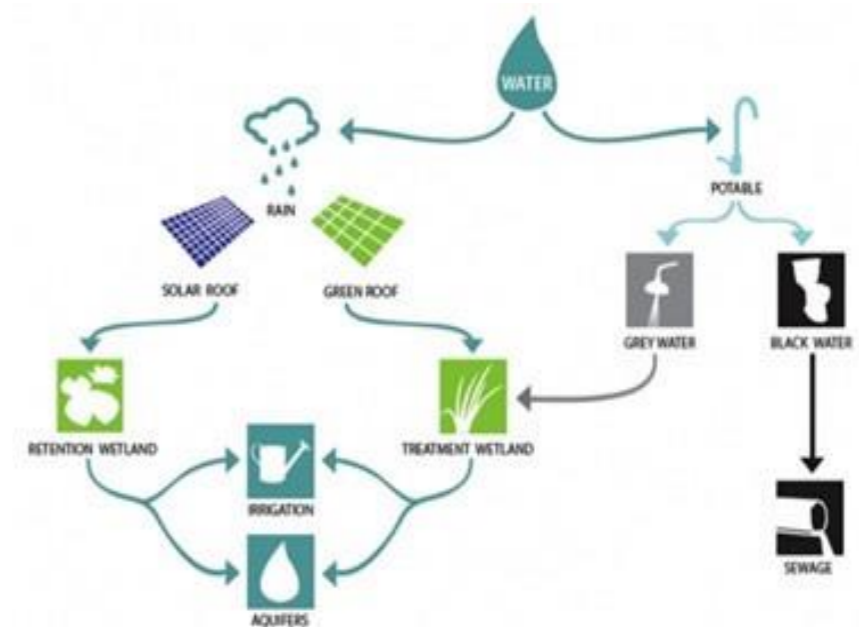
GREYWATER SYSTEMS [NOT RECOMMENDED]

Greywater is waste water from sinks, bathtubs, and showers as well as clothes washers. A greywater system is a system that transports and treats greywater on site for re-use within the building for water closets, urinals or for irrigation. Greywater systems typically require additional distribution and supply piping, filtration systems, disinfection treatment, storage and pumps. In addition collection and re-use of rainwater can be integrated into a greywater system to supplement the available water.



BENEFITS

- " Reduced environmental pollution and waste generation
- " Reduction in Water Use
- " Reduced Infrastructure requirements



DISADVANTAGES

- " Increased initial cost
- " Increased maintenance requirements
- " Increased Energy Use

	Rating (out of 5)
Cost (initial construction)	\$ \$ \$ \$ \$
Payback	Long Term
Environmental Benefit	b b b
Ease of Implementation	
Maintenance Expense	\$ \$ \$ \$

Next Steps

Review all the input / feedback in accordance with the approved budgets, that can be implemented efficiently into the project.

The Design Team will look into “ fine tuning” the design / concept in order to make the building more efficient and sustainable in meeting the workshop goals.